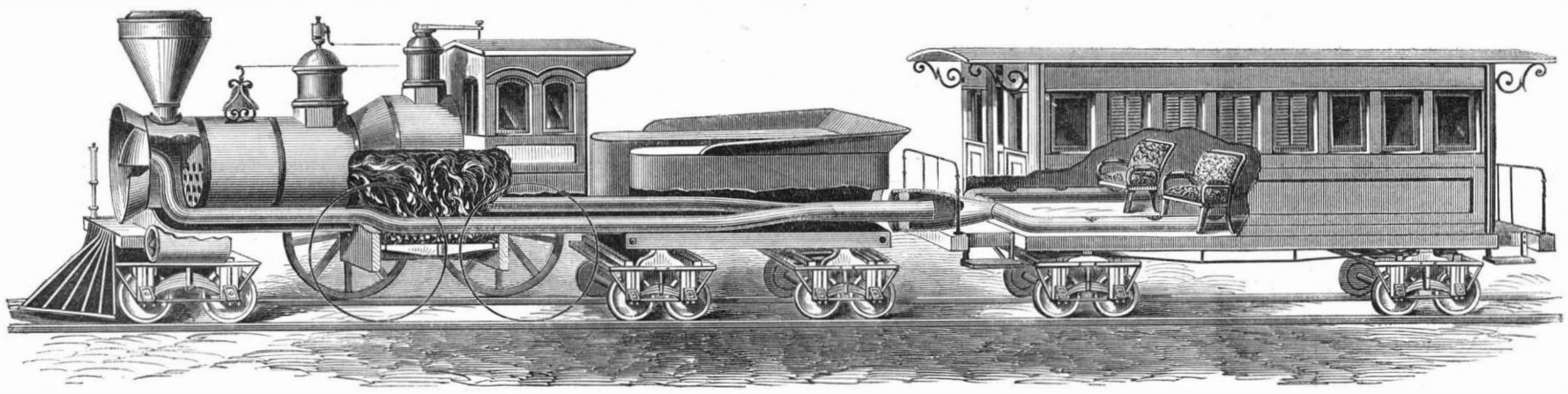
SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XIX.---No. 18. [NEW SERIES.] NEW YORK, OCTOBER 28, 1868. $3 per Annum. [IN ADVANCE.]

Novel Device for Heating and Ventilating Railroad Cars.

The object of the device seen in the accompanying engraving is to utilize the heat of the boiler and fire box of a railroad locomotive to warm a train of cars in cold weather, and to ventilate the cars with pure air free from dust or cinders in summer. The arrangement is quite simple. The front of the locomotive is provided with a funnel-shaped mouth, from which a pipe leads down under the boiler, and in close contact therewith. At the forward end of the fire box it divides nto two branches; one passing along each side and through



FRANCIS' CAR HEATING AND VENTILATING APPARATUS.

the tender, at the rear of which they again unite. Each car is furnished with similar pipes passing along under the seats, and fitted with registers that may be opened and closed at will. The union between the pipes of the different cars is plainly seen in the engraving, a bell mouth containing a packing for the end of the pipe, but sufficiently yielding to allow of lateral motion in rounding curves, etc. The front end of the pipe has a hood inside the funnel mouth, to prevent rain or snow from entering.

It is evident that if the pipes were left exposed to the atmosphere, but little heat could be realized; but to overcome this difficulty the inventor, for winter service, proposes to put a heavy non-conducting jacket entirely around the boiler and fire box, or sufficient to inclose the larger portion of the heating surface and the pipes. The other exposed portions of the pipe are also similarly protected. In the summer the jacketing of the locomotive is removed, and the pipe exposed to the external air.

Patented April 28, 1868, by Dr. Samuel W. Francis, who may be addressed at P. O. Box 240, Newport, R. I. The entire right is for sale.

Improvement in Mandrels for Turning.

The mandrel, one form of which is shown in the engravings, we have lately seen in use in one of the best machine shops in Connecticut, and was struck with its simplicity, ease of operation and evident handiness. It may be threaded to receive a nut for facing up and chamfering, or left plain to receive a gear, pulley, coupling, or anything that requires turning and facing.

Fig. 1 is a perspective view of the mandrel with a nut screwed on ready for facing, and Fig. 2 is a longitudinal section. The arbor, B, is bored through from end to end, the hole, for a portion of the length, being slightly tapering, as seen plainly in the section. From the open end of the taper the mandrel is sawed lengthwise into three equal parts, the slots extending back a distance adapted to the work to be done. A plug, A, fits the hole in the mandrel, and when driven in, it slightly expands the mandrel, holding whatever is seated on it very firmly, the expansion being equable, as the taper of the plug and of the conical hole exactly coincide. A slight tap on the other end of the plug releases the bearing by allowing the parts of the mandrel to resume their former position, a small nut, C, on the end preventing the plug form falling out and getting bruised or lost.

The ordinary smooth mandrel used for turning pulleys, etc., upon, must be turned slightly tapering, while the hole it is intended to fit should be perfectly straight. The mandrel must be driven through until its surface engages sufficiently to hold the object to be turned by its friction on the interior surface of the hole. A slight enlargement of the hole will change the position of the article on the arbor or mandrel, which, especially in turning a taper, as in facing

Fig. 2

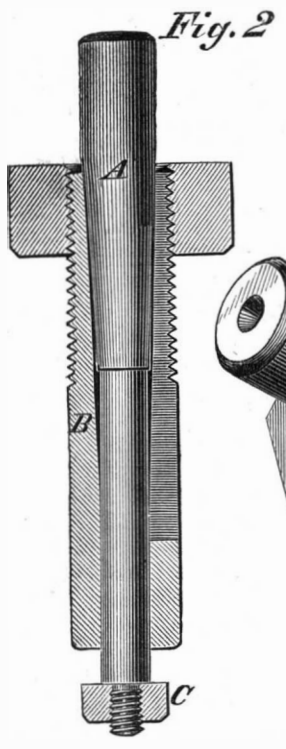
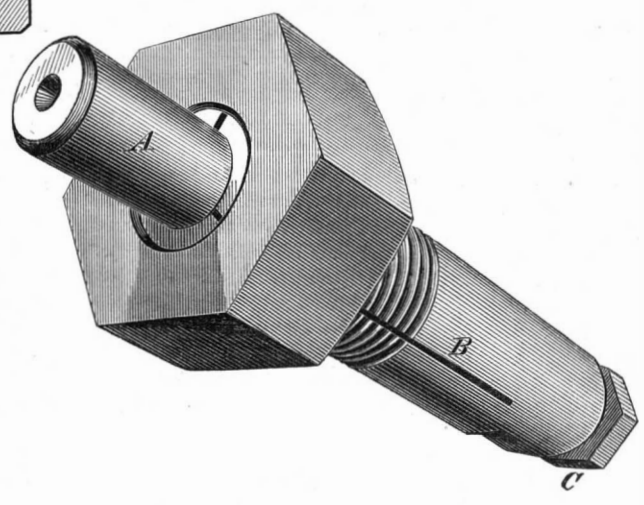


Fig. 1



NAGLE'S PATENT EXPANDING MANDREL.

method of squaring up nuts. Patented August 4, 1868. The mandrels are made of all sizes to the standard gages by the inventor and manufacturer, A. F. Nagle, who may be addressed Box 347, Providence, R. I.

THE ICE TRADE.

During the late tropical weather, ice represented a real power in the community, just as in winter coal is an absolute necessity. No doubt if a few hot summers were to succeed each other we should speedily find as bountiful supplies of ice as we now do of fuel. The polar circle would be our mines, or we should lie in wait for the magnificent procession of icebergs which, according to Captain Scoresby, issue from their breeding places in Davis's Straits, and proceed southward until they touch the warm waters of the Gulf Stream, where they are a constant source of danger to passing vessels. A story is told of an American skipper who sailed upon an expedition in search of one of these bergs, grappled it, and promised himself a splendid reward. In tugging the glittering mass into harbor, however, he forgot that its submerged portion was eight times the depth of that which rose above the water line; consequently he never could get his convoy into any port, and was obliged to abandon it.

The trade in ice is of two kinds—the rough or local ice, which the coster gathers from the ponds and the artificial pieces of water, and the foreign ice, which is used principally for table purposes. The glittering cubes of pure crystal we are accustomed to see on the fishmongers' slabs and in the windows of the Wenham Lake Ice Company are all procured from Norway. A few years since this company procured their supply from Wenham Lake, near Boston, but the expense of freight rendered it so costly that they were obliged to seek for sources nearer home. In the hills situated a few miles from Drobäk in Christiania Fjord there is a very pure lake fed entirely by springs belonging to this company, and from this source all the pure table ice is now supplied. There is a notion that water while in the act of congelation is purged from all foreign matter. This is only partially true. All its mineral salts and any coloring matter it may contain are removed from it, but no organic matter is eliminated in the process. For this reason the clearness of the ice is no test of its purity; many a glittering lump when it dissolves absolutely smells. We state this by way of caution to those who think that the eye is the most perfect test of the purity of this grateful addition to the table. The Wenham Lake Ice Company, when they had satisfied themselves that the piece of water from which they secure their supplies was free from any impurity, not only purchased the lake but the farms surrounding it, in order to keep it in their own hands and secure it from any deleterious local drainage; and it is from this crystal cup that their translucent crops are gathered year by year. The process of reaping the ice crop is the same in Norway as in America. By the aid of a sharp ice plow the surface is ruled with parallel lines 21 inches apart; when the whole surface is marked in one direction the plow is set to work at right angles. In this manner the whole surface is divided like a chess board into squares 22 inches square and about a foot in depth; the ice saw divides these parallel lines, and, by the aid of the spade, a sharp wedge like implement, the squares are split apart with the utmost rapidity. In America, where the weather is at times changeable, the greatest anxiety is felt while the process of reaping is being carried on, lest a thaw should come on and spoil the harvest. It is gathered in as fast as possible into the ice houses, which are, in fact, enormous refrigerators, built of pine wood, with double walls two feet apart, the intervening spaces being filled in with sawdust, which is one of the cheapest and most readily procurable non-conductors. In Norway, where the cold weather is not so liable to be broken up as in America, the harvest is gathered more at leisure; it is secured in the same manner, however, and the ice stores are on a very large scale, sufficient to afford a supply for two or sometimes three years. It seems absurd to talk of ice two years old; to keep the hand of Time from such a perishable article seems an absurdity, but as a fact, much of the table ice now supplied to us was reaped in the latter end of the year 1866. There is scarcely a fjord in Norway in which some trading vessel is not frozen in during the winter months, during which they ship a cargo and run over to England with the first favorable wind. The voyage with a fair wind is not more than four days, hence this island imports nearly the whole of the crop. Thus, in 1865, out of 44,823 tuns exported, this island received 43,359 tuns. The block ice is filled in with rough ice, and during its transport to the ice stores loses ten per cent. These blocks of ice are treated just like blocks of stone; the tools they are lifted with are similar. Considering the quantities that are dealt with, a certain rough handling is unavoidable. When hoisted out of the ship's side they are placed in barges, and conveyed up to the storehouses, protected from the sun only by a tarpauling, and that a black

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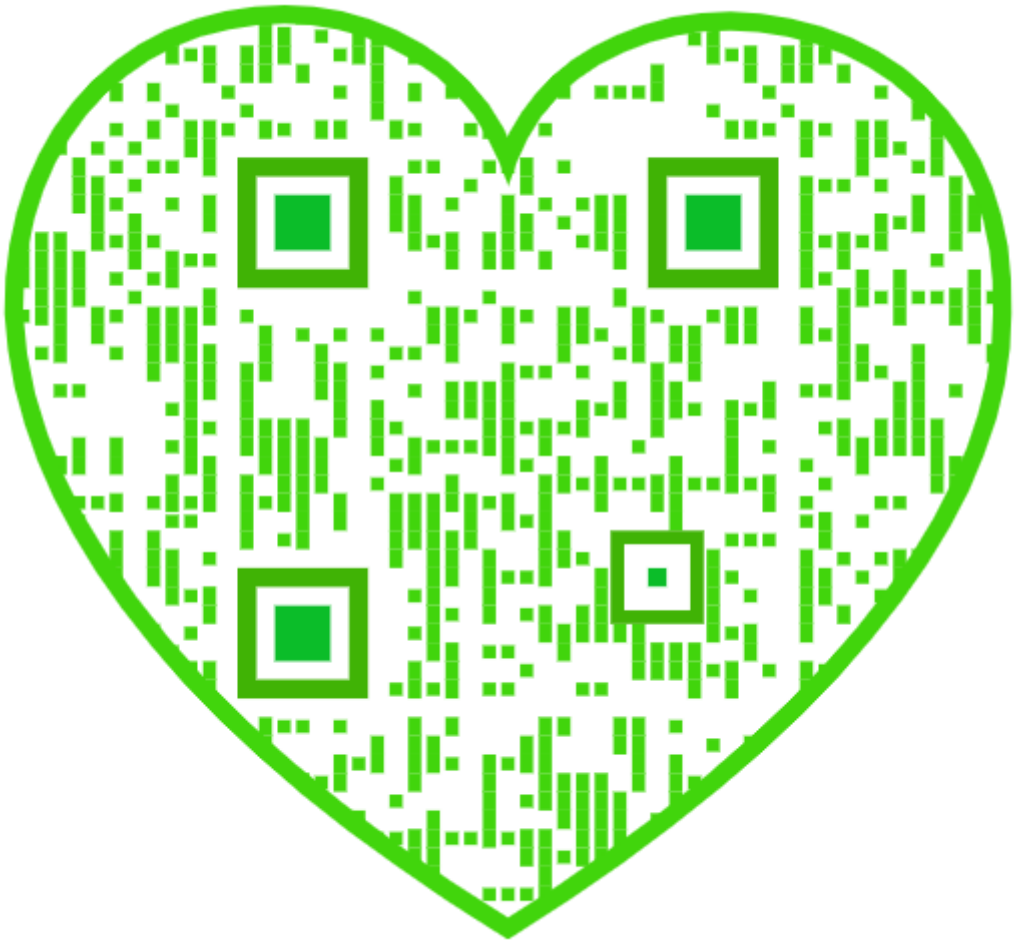

one. It is, therefore, extraordinary that the loss by melting is not more than it is during transport. The loss is at least 50 per cent before it is vended to the purchasers.

When the ice-blocks are stored sawdust is placed in layers between them, and in this manner the rough Cyclopian masonry is built up. If the blocks were placed one upon another without the interposition of any non-conducting substance the whole would become frozen into one solid mass, which would be very difficult to deal with. The blocks, weighing 1 cwt. and ½ cwt., are forwarded to customers in the country packed in bags filled with sawdust. The amount of importation of ice from Norway depends entirely upon the weather here during the preceding winter. It must not be supposed that the main portion of the ice consumed in this country is brought from abroad. Now, as of old, during a hard frost, nine-tenths of the ice consumed in the year by the fishmongers and the confectioners is procured from local sources. The quantity consumed at table is a fleabite to that which is employed in the preservation of food, and for this purpose rough ice is cheaper and better, for the reason that it freezes the matters subjected to it quicker than the block ice. Some of the dealers in rough ice, store away enormous quantities during a hard winter. Some of the wells belonging to them hold a couple of thousand tuns. As it is shoveled in by the costermonger from the parks, or the canals, so it remains until the whole is frozen into a solid mass, which has to be broken up with pickaxes when it is required. Fishmongers consume very large quantities of this rough ice, and the fishing smacks are now enabled to remain at sea a week or ten days by the aid of the ice they carry with them to pack away the fish as fast as it is caught.

Of course tropical weather such as we have had lately greatly increases the quantity consumed, both for the purposes and by way of a supplementary supply to our rough ice. For this reason all figures with reference to the imports of this commodity are fallacious as tests of the aggregate quantity consumed. Unlike the Americans, our taste for ice in our drinks depends upon the state of the thermometer. As a rule the Englishman likes his drink warm. Brother Jonathan, on the contrary, likes it cold. A piece of ice is heard tinkling in the tumbler as often in the winter as in the summer; he acquires during the tropical heat a habit which he continues throughout the arctic cold of his winters. Hence the consumption is pretty uniform throughout the year and nothing surprises him more when in Europe than the sparse manner in which this, to him, necessary of life is used.

During the present season Paris has been largely supplied with glacier ice from Switzerland. This is a great innovation, and possibly will produce a revolution in the ice trade. The desert mountain peaks, glittering in the sun on many an Alp, hitherto valuable only in a pictorial point of view, may come to be commercially valuable. When that day arrives, goodbye to the picturesque in one form at least; it will be sledged away to cool the palates of the snug citizens in the continental capitals. In the majority of cases, however, the glaciers are far too inaccessible to make the ice crops gathered from them commercially profitable.

If the ice trade between America and Europe has fallen off of late years through the greater accessibility of the supply from Norway, the former country still monopolizes the supply to the West Indies, the South American continent, and the East Indies, India, and China The crop of the winter of 1867-8, which seemed to be providentially abundant, in contemplation of the coming hot season, was one of the finest ever known—88,496 tuns were cleared for export from Boston in that year to the countries we have mentioned. The waste on the voyage in these warm latitudes renders block ice so costly in Australia that it is found more economical to produce it artificially by refrigerating machines, and such, worked by steam, capable of freezing thirty tuns per day, are now at work cooling the palates of the Australians, whose liberal habits with respect to the consumption of ice partake more of the American character than our own.

The value of ice as a preserver of life, as well as of animal food on the long voyage to our antipodes, has lately been shown in the successful transportation thither of salmon ova. After many failures, consequent upon attempts to preserve them in the same manner as in this country—namely, by placing them in a running stream of water, at the suggestion of Mr. Moscrop, of the Wenham Lake Ice Company, they were packed in moss and placed between blocks of ice in the ice well of the ship conveying them. This last experiment succeeded, and young salmon are now plentiful in the rivers and preserves of Tasmania. In return for thus exporting a valuable form of fish life to our distant children, they, as in duty bound, have attempted to make some adequate return—to send to the mother country some portion of the animal food which is a mere drug in their own market. Cargoes of beef and mutton in the carcass have been packed in ice and sent home. It arrived quite fresh, but the failure of this process, by which it was hoped to have fed one hemisphere with the redundance of another, was owing to the fact that iced meat required to be consumed immediately; the moment the protection of the ice is removed decomposition sets in with a rapidity which prevents any delay in the hands of the salesman. We may mention, by the way, however, that ice having failed in the chemical process of preservation of animal substances, known as Dr. Medldock's process, is possibly destined to accomplish the end required, and experiments are now being carried on by the Society of Arts to test its value.

Ice having been successful in preserving fish eggs, it is now being tried in the transportation of the eggs of various birds suited to the Australian colonies, and no doubt the substance that is so inimical to life when long exposed to its influence will speedily be made the agent in preserving in its embriotic stage from a too speedy development and death—in annihilating as it were the effect of the death-dealing tropical heat, which has hitherto rendered it impossible for the Englishman to surround himself with his accustomed animal life in his new found home.—*London Times.*

French Leather—How it is Made.

Pont Audemer is watered by no less than eight little rivers, all of which unite in the Risle, within the limits of the town. The little streams are carried zig-zag through the town, stopped here and there by locks and turned aside into canals and ditches, run through scores of mill wheels, carried one over the other in aqueducts, and so generally turned about every street and alley, that almost everybody in town can fish out of his chamber window. It is impossible to enter the town and go to the principal church without crossing at least two bridges. All along the edges of the little rivers may be seen groups of washerwomen, at work from morning till night, each kneeling in a little wooden box, to keep her knees dry, and turning the linen she is washing on a smooth flat stone, and beating it with a wooden paddle. There is probably not a washtub in all France.

THE FRENCH TANNERIES.

But it is not for the benefit of the washerwomen that all these streams have been captured and brought to town. It is for the tanneries. French leather is the best in the world beyond question. The leather of Pont Audemer is the best in France, and sells for from three to five cents more per pound than any other. This fact is all the more worthy of attention, for the reason that no remarkable patent proceeding or chemical process is used, but the leather is simply tanned in the good old way. Your correspondent is, like the *Republican*, radical, and believes in the latest invention, and the newest step of progress, but for once he feels obliged to change his colors, and these are his reasons: Upon his feet at this moment are a pair of boots, bought ten months ago at Pont Audemer at the cost of $4. They have been worn constantly ever since, and have done hard work, and taken very long walks. Yet there is not a frayed spot, nor anything to indicate that with prudent half soling in the future, as in the past, they will not last forever. They are made of calf, tanned according to old fashioned principles. Let us, by all means, have some conservatism in leather—the more the better. The hides used here come very largely from Buenos Ayres, the more so that the specialty of the town is rather in the sole and heavy harness leathers than calf. The calf comes largely from the United States, having been already tanned there. Here it is tanned all over again, and comes out the very best boot leather in the world.

The details of a great tan yard are hardly as agreeable to see and recount as some museum of pictures or fantastic old ruins of castle or abbey; but, after all, it is not so bad in the artistic point of view. The long, low sheds where the bark is stored; the yard stream, with rich brown tan, almost red in the sun light; the vats, half filled with inky-black water; the little stream that bubbles through among the strangely-shaped buildings, where, through open doors, are seen the bare-armed workmen bending over their task, make up a picture which does not lack in charm to the eyes. To the nose it is a different affair.

TAN BARK.

To commence at the beginning of the process, we will first pay attention to the tan bark. It is of course oak; but it is not, as in America, taken from large trees, for the simple reason that the larger the tree the weaker the tan. The bark is assorted according to the size or age of the tree from which it is taken. The smallest is very strong, and used for the very heaviest sole leather, and saddle leather particularly. A coarser grade of bark serves for common cow hides, strop leather, etc., and a still coarser for sheep, calf, and the light hides that are used for making glazed leathers. The way of grinding the bark is of more importance than it would seem at first thought. The mills consist of a long trough in which to put the bark, and a number of perpendicular wooden beams, which the machinery raise and let fall on the bark by means of an eccentric wheel. The beams are shod with an iron plate which terminates in a number of teeth or blades. The bark is thus half broken and half chopped in pieces, and is not reduced so finely as in the ordinary iron mills, but the inner portion of the bark, where the greater part of the tanning is, is reduced to a powder almost impalpable, so that the solution of the salt it contains is greatly facilitated. For heavy leathers this method of grinding is of prime importance, giving advantages both in time and quality of leather.

THE FRENCH SYSTEM OF TANNING.

The hides are first thrown into a vat of lime water, where they remain until the hair is loosened, then they are taken out, the hair removed, and the hides put to soak in the river to remove the lime. After this they are scraped and carried to vats, where they are covered with "juice of tar"—that is, water in which tan bark has been soaked, until the solution is as strong as possible. After three or four days, the hides are again removed and scraped, and put into the vats, where the process is achieved. Here we find the first essential difference between the system of America and the French. In America, the hides are put into the vats with a good deal of water—here they are put in and packed firmly in the vats dry Then, when the vat has been filled up over them with three or four feet of tan, a few pails of "juice of tan" is poured over, hardly enough to moisten the whole mass.

The hides remain in these vats for at least six months—sometimes two or three years, the longer the better.. For first class leather a year is required; but such is the increase of value in hides, in proportion to the time they rest in the vats, that they could not find a better investment for their money. Seven to ten per cent a year is added to the value of the leather by resting in the vats up to four years, after which time there is no further motive for letting it remain, as it has absorbed all it can contain of the properties of the tan After coming out of the vats, the leather is scraped, rolled, dried, and curried; but all these are operations that have no influence on the durability of the leather, being simply matters of ornamentation and finish. The secret of

THE EXCELLENCE OF FRENCH LEATHER

is resumed in these three observances:—1st. Using strong tan, *i. e.*, the bark of young trees. 2d. Packing the leather in the vats dry, and wetting the least possible. 3d. Letting the leather stay a long time in the vats.—*Cor. Chicago Rep.*

Preservation of Leather.

A contributor to the *Shoe and Leather Reporter* gives some valuable hints in relation to the preservation of leather. The extreme heat to which most men and women expose boots and shoes during winter, deprives leather of its vitality, rendering it liable to break and crack. Patent leather, particularly, is often destroyed in this manner. When leather becomes so warm as to give off the smell of leather it is singed. Next to the singeing caused by fire heat, is the heat and dampness caused by the covering of india-rubber. India-rubber shoes destroy the life of leather. The practice of washing harness in warm water and with soap is very damaging. If a coat of oil is put on immediately after washing the damage is repaired. No harness is ever so soiled that a damp sponge will not remove the dirt; but, even when the sponge is applied, it is useful to add a slight coat of oil by the use of another sponge. All varnishes, and all blacking containing the properties of varnish should be avoided. Ignorant and indolent hostlers are apt to use such substances on their harness as will give the most immediate effect, and these, as a general thing, are most destructive to the leather. When harness loses its luster and turns brown, which almost any leather will do after long exposure to the air, the harness should be given a new coat of grain black. Before using this grain black, the grain surface should be thoroughly washed with potash water until all the grease is killed, and after the application of the grain black, oil and tallow should be applied to the surface. This will not only "fasten" the color, but make the leather flexible. Harness which is grained can be cleaned with kerosene or spirits of turpentine, and no harm will result if the parts affected are washed and oiled immediately afterward. Shoe leather is generally abused. Persons know nothing or care less about the kind of material used than they do about the polish produced. Vitriol blacking is used until every particle of the oil in the leather is destroyed. To remedy this abuse the leather should be washed once a month with warm water, and when about half dry, a coat of oil and tallow should be applied, and the boots set aside for a day or two. This will renew the elasticity and life in the leather, and when thus used upper leather will seldom crack or break. When oil is applied to belting dry it does not spread uniformly, and does not incorporate itself with the fiber as when partly damped with water. The best way to oil a belt is to take it from the pulleys and immerse it in a warm solution of tallow and oil. After allowing it to remain a few moments the belt should be immersed in water heated to one hundred degrees, and instantly removed. This will will drive the oil and tallow all in, and at the same same time properly temper the leather.

Influence of Smoke on Vegetation.

The influence of the products of oxidation of fuel on vegetation is different according to the nature of the fuel as well as to the conditions under which combustion has taken place. When the admission of the air has been freely made so as to allow perfect combustion, the products of the latter will be carbonic acid, water, nitrogen, and sulphurous acid, in case the coal was contaminated with sulphur. Of these only the sulphurous acid is of a vitiating nature. When, however, coal is subjected to a slow heat, quite a number of products are obtained, of which many are, even in small quantities very injurious to vegetable life.

Smoke is neither the product of very slow nor very quick combustion, it is therefore clear that it will not always act in the same manner. The smoke which ascends from the chimneys of our dwellings is the product of a nearly perfect combustion, this, however, is not the case when coal is burned in factories, for instance under steam boilers. The reasons for this assertion find their explanation in the following:

1st. Fresh coals are in short intervals added to the burning ones. The formation of resinous and tarry matters, which on the hearths of our dwellings occurs but occasionally, therefore never ceases.

2d. The draft in the chimneys of our houses is little as compared with that of the high chimneys of factories and machine shops. The imperfect products of combustion of the former will therefore be condensed in the chimneys and partly be deposited, while those of the latter, will escape in the atmosphere and while condensed descend in the neighborhood of the chimney.

3d. Smoke always contains more or less solid carbon in minute division. The same will, while floating in the atmosphere, absorb part of the resinous and tarry matters by which it is surrounded. The thus impregnated carbon will, in descending upon the vegetation and in being deposited on the latter, not only form a hindrance to the absorption of the sun's rays, but, by its acid properties, doubly act as a destroyer.

Prof. Crace Calvert, is of the opinion that these facts explain why the vegetation in the vicinity of London is in a much more vigorous condition than in that of Sheffield, Leeds, Birmingham, and Manchester.

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Owing to the inferior coal which they use in these centers of manufactures it is not to be denied that their air must be more contaminated with sulphurous acid, than it is the case on the banks of the Thames. This acid gas, however, will as all gases be diffused very quickly in the atmosphere, particularly while at a high degree of temperature; its influence can therefore by no means be injurious in comparison to that produced by the deposition of soot.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

For the Scientific American.

NEW APPLICATION OF THE SPECTROSCOPE TO DETERMINE THE MOTION OF THE STARS.

In order to explain this recent and most ingenious application of one of the most important pieces of modern apparatus, we must first understand what is the cause of the dark lines exhibited in the solar spectrum by the spectroscope, or rather, what they in general indicate

We follow in this explanation, of course, the undulatory theory, it being the only one which gives a rational explanation of all the phenomena. We will therefore not speak of the Newtonian doctrine of emission, which ought to have been abandoned long ago, and not be mentioned any more, as it is utterly untenable in the present state of our knowledge of the properties of light—a knowledge far in advance of any other branch of physical science.

Light is propagated like sound, by vibrations of some transmitting medium, but its vibrations are millions of times more rapid; so in sound the lowest perceptible tone is produced by about 16 vibrations per second, the highest by 9,000 or 10,000—a range of about 8 or 9 octaves. The lowest visible luminous vibration is produced by 450 billions vibrations in a second, the highest by 850 billions. (We call the square or second degree of a million a billion, the cube or third degree of a million a trillion, etc.) The lower vibrations produce the impression of red, the highest of violet, and the intermediate vibrations the different intermediate colors of the rainbow or spectrum, which in fact (as was already remaked by Newton) may be compared with the musical scale, of one octave, 450 to 500 billions vibrations per second produce red; 500 to 550 billions, orange; 550 to 600 billions, yellow; 600 to 650 billions, green; 650 to 700 billions, blue; 750 to 800 billions, indigo; and 800 to 850 billions, violet. We use here only the round numbers, as approximately near enough for our purpose. The numbers given represent the velocity of the vibrations where one color is shaded off into the next; the pure red, yellow, blue, etc, of course correspond with the intermediate velocity of vibrations.

Vibrations of a lower velocity than 450 billions per second manifest themselves simply as heat, without light; those of a greater velocity than 850 billions, as a chemical power; and consistent with this is the fact that the red and orange rays produced by the lower vibrations have also, with the dark space beyond the spectrum, a heating power, and the blue and violet rays, produced by the vibrations of higher velocity, possess, with the dark space beyond, no heating, but chemical power (the photographic rays).

In the solar spectrum as exhibited by the spectroscope, the velocity of the vibrations increases regularly from the red end of the spectrum to the violet; and if all possible intermediate velocities did exist, the spectrum would be continuous; but the fact that it is not continuous, and possesses a multitude of dark spaces, proves that certain definite velocities are wanting; so, for instance, at the place corresponding with a velocity of 560 billions, there is a dark line in the solar spectrum, indicating that vibrations of this definite velocity are wanting, we may have those of 550 and 570 or thereabout, but between these limits the dark space proves the nonexistence of rays of that definite velocity.

Now, in sound, the apparent velocity of the vibrations is increased or diminished, in proportion as we approach or leave the sounding body, with a velocity rapid enough to be compared with that of sound itself. The result is a change of pitch; and the whistle o an approaching locomotive will appear sharper, and of a retreating one flatter, than its real pitch—a fact well established by theory and experience.

This peculiarity rests on the same principle as that the waves, encountered by a steamer, appear larger when both are going in the same direction; and shorter, when the steamer moves against the direction in which the waves are transmitted. (See page 117.)

When now we move towards a luminous body, with a velocity great enough in relation to that of light to make the waves appear to be sensibly shorter, we must perceive a change in the tint of color, as in sound we perceive a rise of pitch. This change will be toward the more rapidly vibrating or violet end of the spectrum—that is, from red to orange, from orange to yellow, from green to blue, etc. When we recede from the luminous body, of course the reverse will take place. Now this slight change of color, even if possible to observe its existence distinctly, is not adapted to be measured like the pitch of a tone. This is impossible, from the nature of color; but the definitely located dark lines in the spectrum, as exhibited by the spectroscope, may be correctly measured as regards their exact locality; and all that is necessary is to compare the spectrum of a luminous body, which remains at the same distance, with the lines of the spectrum of a body to which we are approaching, or from which we are receding.

The last class of observations have quite recently been made by Mr. Huggins, of the Royal Society of London. Among others, he has compared the spectrum of the star Sirius with that of a flame producing some of the same lines, and found that (notwithstanding the enormous velocity of light, as well in its transmission through the universe, as in the velocity of its waves) not only was the incomparably slower motion of this star rapid enough to exert an appreciable change in the position of the dark lines, but he succeeded in measuring its amount. He found, for instance, that a certain dark line, corresponding with a bright line in a flame of hydrogen, was shifted toward the red end of the spectrum, which indicated that we are receding from that star; and from the amount of displacement, it was calculated that the motion was not less than 144,000 miles per hour. This was reduced to 90,000 miles, by taking into account the direct velocity of the earth, in its annual orbit round the sun, at the time of the observation.

When we consider that the only means thus far possessed of estimating the motions of the stars in relation to us, or of the earth in relation to the stars, was the apparent displacement of the stars among themselves, and that this apparent displacement is found to be very irregular, by reason of different motions and consequent changes in relative positions of the stars among themselves, we must conclude that this new method of measuring stellar motion is a very promising one; and when extended to most other stars, will open an entirely new, unexpected, and unexplored field of research in astronomical science.

P. H. VAN DER WEYDE, M.D.

Water-Seeking---The Divining Rod.

MESSRS. EDITORS:—At times we meet with reference, especially in fictitious writings, to those who can find, with a hazel twig, the places of water courses beneath the ground. Many will unhesitatingly declare that this cannot be done, and that it is merely a whim of the credulous. Hence, it may well become those who are interested in scientific truth, to consider whether there is any reliance to be placed in the claimed power of successful water-seeking.

An elderly gentleman, of most reliable character, states that when he was a youth, and lived at his home, some miles north of Philadelphia, water was obtained for domestic purposes from a natural spring situated a little below the house. A neighbor, who lived upon higher ground, and made use of the same spring, at considerable inconvenience, had made repeated and unsuccessful attempts to secure a well.

At length, hearing of a man in another place, more than twenty miles distant, who could decide, by the use of a branched stick, upon good localities for wells, he sent for him. On arriving, the man passed about the grounds with a suitable stick in his hands, and pointed out a favorable spot at some distance from the house where the surface of the earth was nearly twenty feet higher than places one would ordinarily select.

He also, though an entire stranger in the region, followed the curving line of the hidden stream across a road, and through fields, to the spring mentioned above. A well was dug on the line proposed, with entire success; and, subsequently, a second one. Each was a little over twenty feet in depth, though the latter was at a point some sixty feet lower on the surface.

A gentleman at Andover, Mass., a few years since, purchased a fine residence, that was poorly supplied with water. Repeated attempts had been made to sink a well, but in consequence of rock, or firm clay, no water was reached. The owner secured the services of a member of the Theological Seminary in the place, who was said to have the water seeking ability. He took in his hand the stock of a whip, and held it by the portion toward the small end, so that the heavy part would be erect. On his passing across a certain portion of the grounds, the end that had been upward would bend down sufficiently to make less than a right angle with the portion in and below the hand, and would swing round as he went forward. After successive observations he pointed out a line, beneath which he claimed there was a stream of water in the earth; but at what depth he did not attempt to decide.

If any other of those present held the rod, it did not move: but if he placed his hand on that person's shoulder, it would give the same indications as in his own. If he placed a silk handkerchief between his hand and the rod it failed.

A well was dug in accordance with his suggestions, which, passing down along the vertical face of a buried ledge, at the depth of seventeen feet, afforded a fine supply of water. He selected places for a number of wells in the town, and always with success.

His explanation of the phenomenon was, that the flowing stream was charged with resinous electricity, and, that when a stick, fitted for the purpose, was carried in the hand of a person vitreously charged, and brought over that water, it would be attracted.

That there are streams in the earth we have many reasons for believing. Some years since there were two manufacturing establishments in England, a considerable distance apart, which made use of large quantities of water. It was found that when the pumps of one were used actively, the wells of the other were drained, and it became necessary for them to secure their water on alternate days. This proves a communication between those wells.

In the boring of artesian wells, also, proof of the existence of subterranean streams has been afforded. Hitchcock says, that "at St. Ouen, in France, at the depth of one hundred and fifty feet, the borer suddenly fell a foot, and a stream of water rushed up." A paper has stated, that, in Chicago, twelve hundred feet below the surface, a vein eight feet in depth was reached, with a current so strong that a long lead, upon a fine wire, lowered into it, was snatched from its position very much as an insect upon a hook is taken by a fish.

It is not difficult to conceive of these streams being in an excited electric condition; and this view is favored by the assertion of some philosophers, that lightning more frequently strikes upon their course.

And, again, we know that persons are not unfrequently in a highly electric state, as manifested when one, especially if partially insulated by wearing rubbers, has taken a vigorous walk on a clear and windy evening, in a dry atmosphere; for then, upon folding together the edges of an outer garment, on removing it a line of sparks, attended with sound, often appears along the meeting edges. It is also shown, by some persons being able, after moving the feet along a carpet, to light gas with the finger.

Arago refers to the surprising pleasure which it afforded him to see, not only a few metals, but wood, and various other substances, affected by the poles of a magnet, being either attracted or repelled. Remembering that magnetism and electricity have many common features, and are even considered by some of our best natural philosophers as different manifestations of the same agency, is it absurd to conceive it possible that a rod, in the hands of a person in a certain electrical condition, may be attracted by a hidden stream of water in an opposite state?

We should not be deterred from thoughtfully considering the subject, simply because some may be incredulous. An aged philosopher was regarded deranged, by casual observers, when he was experimenting with films of viscid water upon the properties of light, though his researches were to result in brilliant conclusions for science. And, always, efforts employed in searching out the more subtile and recondite laws of matter have a rare value, and hence are not to be regarded as trivial.

Massillon, O. J. K.

Returning Condensed Steam to the Boiler.

MESSRS. EDITORS:—As a constant reader of your paper, I take the liberty to ask you the following questions: I have a tubular boiler in the basement of my mill, and wish to heat three floors above with steam; the top of the boiler, which is horizontal, is three feet below the lowest floor, which I wish to heat. Can I not, with perfect safety, take steam from the top of my boiler, and allow it to return (or the water that condenses from it) by the pipe that feeds the boiler, provided I put in suitable cocks to shut off either the pump or the return condensed water, as it becomes necessary to use the pump, and would it not be perfectly safe to shut off the condensed water at such times as I should find it necessary to pump? I am told by parties who make piping mills their business, that my plan is not safe, and I must return my condensed water to a tank, and then pump it in. I cannot understand why this should be so, and would like your opinion on the subject in the SCIENTIFIC AMERICAN, together with such information as you may be willing to give.

Suppose I allow all my pipes to slant one thirty-second part of an inch to the foot, toward the upright supply pipe, and have that one and a half inch diameter, will not all condensed water run back to the boiler, and will not everything be safe, say at eighty pounds steam, or less?

Stoughton, Mass. C. S.

[Your proposed plan is one very generally in use. You would, however, not be able to return the drip or condensed steam from the first floor, three feet, as the weight of the column would not be sufficient. Your method of slanting your pipes toward the upright supply pipe, and having that of good diameter, is correct. There is nothing dangerous nor difficult in the arrangement, if properly put up and properly attended to.—EDS.

How to Catch Rats.

MESSRS. EDITORS:—In reading your excellent paper, I have frequently noticed devices for the extermination of rats, mice, and other vermin. Different contrivances have, from time to time, been presented to the public, and each claiming to possess some superiority which others have not attained. I do not doubt concerning their efficiency; but as a general thing, the cost of patent machines places them beyond our poorer population, while many of the wealthy are incredulous, and prefer to employ the old style of trap. Now if a drop of oil of rhodium be poured upon some bait, in a common or wire spring trap, and the said trap be set in an infested locality, only a short time will elapse ere the cage will be found occupied by vermin. Rats and mice possess a great liking for the oil, and, when scented, will risk anything to obtain it. I have cleared my cellar of the pests by the above method, and others have tried it with similar success. The oil of rhodium costs about one cent per drop, but a drop will last several days.

New York. J. C.

[Rhodium oil is an extract of a Chinese rose-tree—*Convolvulus Scoparius*—and the perfume is similar to that of roses. This oil, as well as that of anise and asafœtida, is often used to attract fish, insects, and other animals.—EDS.

The Shifting of the Center of Gravity of a Revolving Wheel Tested by an Astronomical Fact.

MESSRS EDITORS:—Our earth is, in relation to the sun, a wheel, or rather ball, of which the plane of rotation is vertical; its axis being in March and September horizontal, and inclining gradually, until in July and December it reaches an inclination of 23°, of course all considered in relation to the great luminary, of which the attraction of gravitation surpasses that of the earth more than three hundred thousand times.

If now the theory that the center of gravity shifts toward the descending portion of a wheel or ball be true, the center of gravity of our earth must continually be shifted toward that side which, in its daily rotation, is moving or falling toward the sun, that is, toward that meridian where it is 6 A. M.; and this shifting of the center of gravity would necessarily be perceptible in the tides. A high tide wave would

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take place at the equator at 6 A. M., or a few hours after, of course modified by the tide wave due to the moon's attraction.

What is the case, however? The solar tide wave takes place under the equator two or three hours after midday, proving that it is due solely to the solar attraction, which shifts the center of gravity of our earth directly toward the sun, as the lunar attraction shifts it constantly toward the moon; and the combination of these two attractions, in the different relative positions of the sun and moon, produce the difference in hight of the tides, spring tides, etc. Observations continued for centuries over almost the whole earth in the interest of navigation, have settled the subject of these tides in such a rigorous manner, that we know positively the non-existence of a tide wave, due to the shifting of the earth's center of gravity, toward that half which in its daily rotation is falling toward the sun.

In the same manner as the attraction of the sun brings the center of gravitation of our earth toward that luminary, so the attraction of our earth tends to bring, in all terrestrial bodies, rotating or at rest, the centers of their own gravitation or mutual attraction nearer to the earth; only this mutual attraction of terrestrial bodies is so infinitely small, when compared with the earth's attraction, that it cannot be perceived except with very delicate contrivances, like the torsion balance of Coulomb, who already, seventy years ago, demonstrated this mutual attraction of all bodies on the surface of our earth.

It appears to me that the chief cause of error in those who defend the notion that the center of gravity of a vertical revolving wheel shifts toward the descending portion, or toward the ascending portion (there are some persons who also defend the last idea) is, that they overlook the fact that gravitation acts on all the particles of bodies either in rest or in motion, ascending or descending, with the most perfectly equal force, and that a body is not lighter when ascending nor heavier when descending, or that the attraction of gravitation will not diminish as soon as the body obeys this attraction by falling, nor that the attraction will increase when the body moves against gravitation. The adherents to the last notion maintain, of course, that the center of gravity of the wheel shifts toward the ascending portion. Every one of these notions is erroneous, and beside they would not explain the gyroscope, even if true.

Another cause of error is that the centrifugal force is confounded with the tangential force. They are not the same. The first is the amount of pull to the string when whirling a stone around, and is simply due to the tendency of all bodies to move in a straight line; the last, the tangential motion, is obtained when occasion is given to the body to move in that straight line, and the velocity of this tangential motion will be exactly equal to the motion of the body in the curve in which it moved previously, only continued in a straight line.

I close in expressing my surprise that Mr. McCarroll, the reputed discoverer of the notion, on page 243, in place of admitting that I was right in my statement (page 195) that this thing was not new, and more than ten years ago, mooted in connection with the gyroscope, "informs" me about these facts. He desires that my observations might be more intelligible. I believe that unprejudiced persons by careful reading will easily understand my short description of the apparatus which disproves totally his theory. With mere words, without figures, it could not be made more clear; and I trust that very few readers of the Scientific American, will need to be further enlightened on this subject. If so, I am willing to give figure and description.

P. H. Vander Weyde, M. D.

An Aerolite.

The Anglo-Brazilian *Times* of the 7th August contains a communication from Dr. Franklin Massena, giving an account of an aerolite which he observed at the Observatory of Itataya upon the 30th July, near daybreak. He says:

"Suddenly, toward the east, at almost 30° of the meridian, I saw an immense and beautiful aerolite crossing to the southwest. I called Messrs. Arsenio and Veija, and together we watched the disappearance of the luminous body, and its form and motion. Its form was that of a globe, having an apparent diameter of about 43′, and a tail of 9°, in an elliptical curve extending into space with an inclination of about 30°. The tail was an oval form and very divergent toward the part away from the nucleus. The motion was made by the nucleus, the tail following its track. Both the tail and the nucleus were as brilliant as electrical light, and emitted some luminous drop or tear-like particles, which threw out silvery sparkles with incredible rapidity. Six minutes after its meridian passage the body exploded toward the southwest. Such was the rapidity with which it moved that in 17 seconds it traversed a celestial area of 77° 41′, losing itself behind a hill at 5 hrs. 55′ 50″, or 17 hrs. 55′ 50″ of true solar time.

"This aerolite so disturbed the magnetic instruments that the declinometer turned its pole from the north toward the west and stuck itself in the box where it found resistance; the horizontal magnometer turned toward the west eight divisions of the scale; the vertical magnometer fell in its center of gravity, and finally, the compass oscillated 15° from north to west. I showed Sr. Arsenio the disturbed state of the declinometer. It is, therefore, demonstrated for physics that an aerolite has an intense action upon the north pole of magnets, powerfully attracting them.

"The following are some mathematical elements of the orbit of this body: Meridian passage, 5h. 55′ 33″, on July 30, 1868; declination, 65° south; vertical distance, 42° 32′; setting, 50° 15′ W. by S.

"With these data the orbit of the aerolite is found to have 17° 40′ of inclination upon the line of the earth's rotation, with its movement contrary to that of the earth.

"At 6 o'clock, at the moment of detonation, the state of the atmosphere, to be taken into account for the calculation of tance, was, Bar. 584·3; Ther. C. 8° 3; Hyg. of relative humidity 76·5. Sky clear and cold; wind N. W., weak. The motion of the aerolite was followed by a noise like that of silk dragged over the ground. The aerolite must has passed between Itajuba and Guarantingueta, and it remains now to find out where it fell in order to ascertain its size."

JOHNSON & FROGGOTT'S PATENT HORSE SHOE.

The principal wear on horses' shoes is on the calks, particularly on hard roads or paved streets. It is evident if these calks could be readily removed when worn, and replaced by others, the cost of shoeing would be materially reduced and many inconveniences avoided. Screws for attaching calks to shoes have been used, but the liability to loosen, turn, and eventually to come off, seems to be objectionable.

The device, herewith illustrated, is intended to provide a means of preventing these difficulties. The shoe is in the usual form, but without protuberances. The toe calk, A,—a separate piece—and the heel calks, B, also separate, are attached to the shoe by a screw secured in their upper surface,

Fig. 1

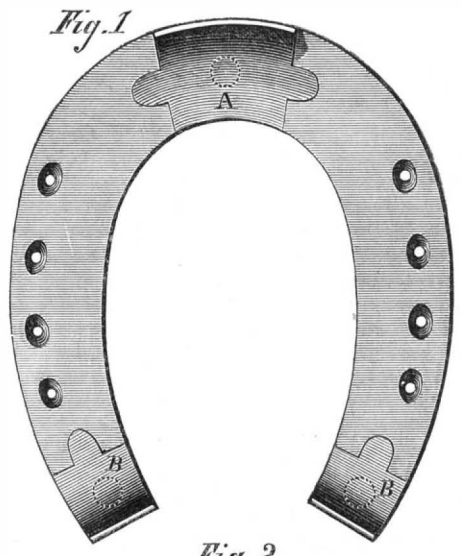
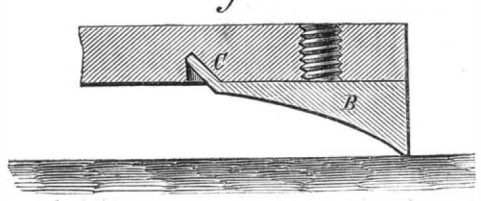


Fig. 2



which fits a correspondingly threaded hole in the shoe, shown in Fig. 2. The toe calk is provided with two projecting pointed arms and the heel calks with one each, which after the calks are screwed in place, are bent down and seated in depressions in the under side of the shoe. See C, Fig. 2. These arms prevent the calks from casually unscrewing or turning, and tend to assist in their support, and the calks may be easily detached and replaced by others.

Patented through the Scientific American Patent Agency, Sept. 29, 1868. Address, for further information, P. C. Johnson, Central City, Colorado.

The Semaphore Steering Apparatus.

A Liverpool paper gives an account of a new steering apparatus, recently invented by an officer in the English Coast Guard Service:

"The difficulty hitherto experienced of knowing and indicating exactly, when vessels meet each other on the high seas or in narrower waters, the course which each vessel intends to take, Mr. Read's invention is intended to obviate. Mr. Read's plan is to connect by a self-acting apparatus the helm of the ship with the starboard and port lights during the night, and with a flag or ball signal during the day, so that any movement which is given to the helm is at once correspondingly indicated to any approaching vessel. A rope or chain is rove through a block, or cheek, at the masthead, from thence to a block hooked on the ship's side and laid along the rail or water-ways through a tube to a block abreast of the wheel or tiller, the turns are passed under and over the barrel of the wheel and to the end of the tiller if the rope or chain is placed on the barrel of the wheel. The port and starboard lights are then placed in connection with this apparatus, and the result is that the turn of the wheel to the right tightens the line attached to the starboard light, raises it from the box in which it has been concealed, and places it fully in the veiw of any vessel approaching. A similar movement of the wheel to the left raises the port light, and starboard light descends and disappears from sight. The lights are placed in metal tubes open at the front, so as to show the light clearly to approaching veesels, and with holes at the back, so that not only may the steersman see that the light is working properly, but vessels approaching from behind may know the exact course which is being taken by the vessel in front of them. If the helm is put the wrong way, as is often the case, the officer in charge of the ship will be able to check the helmsman in an instant, or a ship approaching will detect the mistake and act accordingly. The apparatus is so simple that any cabin boy can rig and repair it when it is out of order. By the use of the apparatus all speculation as to which side a vessel will pass another is at an end, and should a collision take place between ships with the apparatus on board, the party upon whom the blame rests is at once indicated. The lamp signals are of course for use by night; for day signals, the same apparatus puts in motion a yardarm at the masthead, with green or red flags or balls which are seen to port or starboard in accordance with the motion of the helm. The invention has its useful application also in naval tactics; for when the hulls of ships are enveloped in smoke, the rudder can be indicated by the signals made at the fore, main, or mizzen royal truck; and thus, tacking in succession, ships would be able to follow each other accurately either by day or night. Captain Mends, R. N., and other officers, upon whose judgment and experience reliance can be placed, have warmly encouraged Mr. Read's plans; Captain Mends being of opinion that, whether the invention is adopted by the Board of Trade for the high seas or not, it will assuredly be of service in narrow waters."

The Liverpool correspondent of the *New York Mercantile Journal*, gives the history of the invention as follows:

Some time ago Mr. George Read, a chief officer in the Coast Guard Service, stationed in the South of England, dreamt that he could distinguish at a great distance the course a vessel was steering by seeing the movements of her rudder. At first he thought nothing of his dream, and discarded it as a meaningless phantasy. A few nights after, however, he dreamt the same thing, and the peculiarity of the occurrence caused him to ponder over the subject of his sleeping thoughts, and to consider whether the course of a vessel could not be indicated by some means different to what had been in use. Reflection led to the conclusion that there was "something in it," and the result of this wonderful dream, worked out by the skill of the dreamer, was the invention referred to in this letter, which Mr. Read has perfected and brought into practical use, viz: the "Semaphore steering apparatus."

A New Way of Estimating the Motion of the Stars.

A remarkable paper has laterly been sent to the Royal Society in England by Mr. Huggins, one of the Fellows. It announces the application of a new and most promising method of inquiry to the determination of the stars' motions. Mr. Huggins tested this method by the motions of the star Sirius. The spectrum of this star is crossed by a multitude of dark lines, and among others by one known to correspond to a bright line seen in the spectrum of burning hydrogen. The two spectra were brought side by side, and due care having been taken to magnify as much as possible any discrepancy which might exist, it was fonnd that the dark line in the spectrum of Sirius was not exactly opposite the bright line in the spectrum of hydrogen, but was slightly shifted towards the red end of the spectrum. It followed from the amount of the displacement that at the observation Sirius was receding from the earth at the rate of about forty miles per second. When due account is taken of the earth's orbital motion at the time of observation, it results that Sirius is receding from the sun at the rate of about twenty-eight miles per second, or upwards of nine hundred millions of miles per annum.

The new method of examining the stellar motions (says an English paper) is a most promising one. It will doubtless soon be extended to other stars. In fact, nothing but time and patience are required to enable astronomers to extend this method to all the visible stars, and even to many telescopic ones. For the latter purpose, however, an instrument of enormous light-gathering power will be required, and Mr. Browning, F. R. A. S., the optician, is engaged in constructing a spectroscope to be used with the great six-feet mirror of the Parsontown reflector.

Rapid Telegraphic Communication.

The *Telegrapher* says: "It may be mentioned, by way of showing the important aid rendered to modern commerce by the wonderful operation of the magnetic telegraph, that a mercantile house in this city on Tuesday received a dispatch dated Calcutta, September 21, which had been less than twenty-four hours on its way, and which conveyed the fact that their ship was ready on that date to sail for Boston. We believe this is the quickest time yet employed in communicating between these two commercial cities—so wide apart and yet so near together."

We noticed in the *Tribune* of October 2d, the following announcement:

"An attempt was made, yesterday, to assassinate the Viceroy of Egypt while he was attending a celebration in Cairo."

So much has been said and written upon the wonders of telegraphic communication, that the subject has become a trite one; yet we confess our wonder at the developments of the art of telegraphy grows rather than diminishes. Think of it. Less than one day from Egypt! Only one day from Calcutta, and the end is not yet. No further apart than Albany and New York were twenty-five years ago. Newspapers have a good time. If no catastrophe occurs in America, somebody is sure to be struck by lightning in China or somewhere, it don't matter where; it all seems to belong to us, and we are beginning to feel an intense interest in the little family matters of our next door neighbors in Japan. No dearth of news now. Our eight page dailies come literally gorged with items from everywhere, borne silently and swift as light by the wonderful electric current. Old superstitions, effete systems, heathen darkness, get up and move; your date is out.

It stated that a cement impermeable by air and steam, which is said to be superior to any in use for steam and for gas pipes, can be made as follows: Six parts of finely powdered graphite, three parts of slaked lime, and eight parts of sulphate, are mixed with seven parts of boiled oil. The mass must be well kneaded until the mixture is perfect.

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Improved Direct-Acting Steam Hammer.

Simplicity being, next to efficiency, the most important point to be aimed at in the design of steam hammers, the form illustrated in the annexed engravings should commend itself to all who have occasion to use this class of tools. There being, with the exception of the regulating valve, but one moving part in this hammer, there seems to be nothing left to be attained on the score of simplicity. Fig. 1 is a perspective view of the hammer, and Figs. 2 and 3 vertical sections showing two positions of the hammer.

The ram being down, as in Fig. 2, steam is admitted to the annular channel, A, and from thence in the direction of the arrow, through the vertical passage, B, to the under side of the piston, C, the passage, D, communicating through the piston with the portion of the cylinder above the piston, being open to the exhaust as seen, whatever steam there may be above the piston escaping in the direction shown by the arrows through the passage, E, to the exhaust. The steam admitted at A, and passing up the passage, B, lifts the piston until the passage, D, connecting above the piston, opens to the steam inlet admitting steam over the piston. Notwithstanding this, the momentum of the ram continues the upward stroke until the passage, B, opens to the upper exhaust, when the parts are in the position seen in Fig. 3, to which we will now direct our attention, similar letters denoting the same parts.

The pressure of steam above the piston combines with the weight of the ram to carry it down with great force, until the passage, B, is uncovered to the steam inlet, A, and the passage, D, is open to the lower exhaust port, when the motion is reversed, the piston cushioning on the steam admitted through B.

The admission of steam and consequent speed of the hammer is regulated and governed by the foot of the forger, as plainly shown in Fig. 1. A hand gate also may be placed on the steam pipe if desired. Thus a slow and light blow, or a rapid and heavy one can be obtained at pleasure. For work requiring rapid and uniform blows, such as drawing small steel, making cutlery or edge tools, planishing saws, etc., this is a very efficient hammer. We witnessed its operation at the works of the American Tool Steel Company, corner Kent avenue and Keap street, Brooklyn, E. D., N. Y., with great satisfaction. This hammer is the invention of David Joy, of England, and has been patented in this country by Merrick & Sons, 430 Washington avenue, Philadelphia, Pa. For terms and prices address as above, or Geo. Birkbeck, Jr., the agent, at their office, 62 Broadway, New York city.

Fig. 1

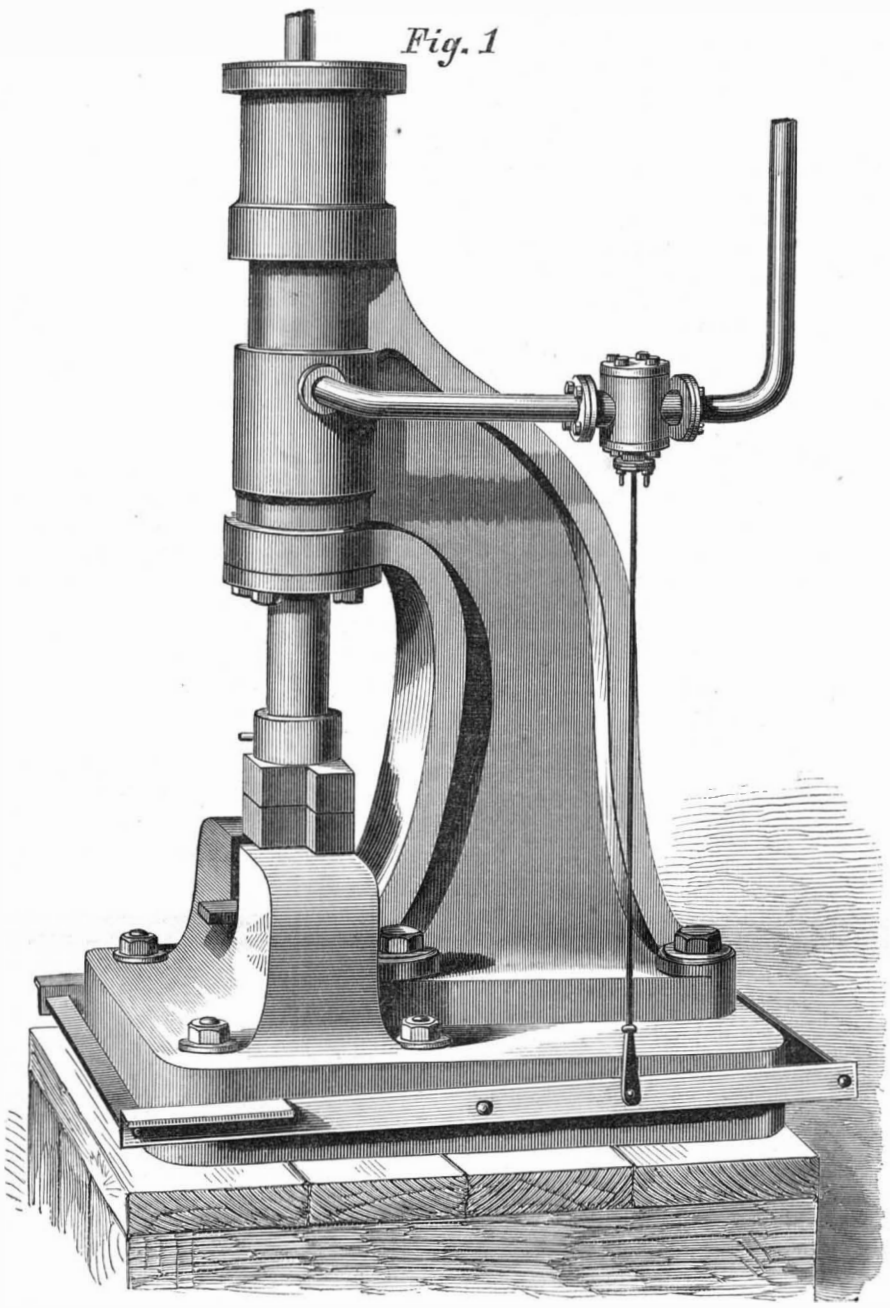


Fig. 3.

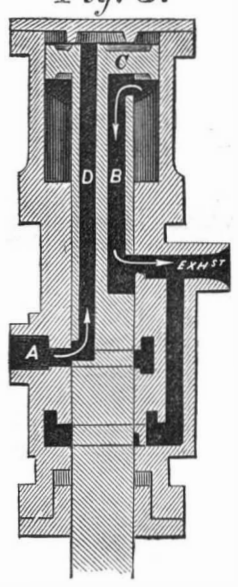
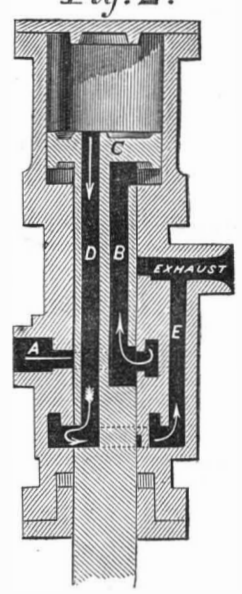


Fig. 2.



THE JOY PATENT STEAM HAMMER.

CAN WATER BE SOLIDIFIED BY PRESSURE?

In No. 19 of the current volume of the SCIENTIFIC AMERICAN, a correspondent asks the question, "Is there any depth in the ocean to which an iron weight or bar would not sink?" We answered no. An exchange has taken up this subject. It says "it is the popular theory, that lead, at great depths, remains suspended in the water and refuses to sink further. The theory stated is not correct. The fact may be as alleged, namely, that the lead refuses to sink, on reaching a certain depth below the surface of the ocean; but this is not because it is equally balanced by the water, nor is it in a state of equilibrium. We presume it will not be denied that a solid will float on the surface of a liquid, as iron on quicksilver, only when the the specific gravity of the latter exceeds that of the former; also, that a solid remains suspended, or equally balanced, in a liquid, only when the specific gravity of the latter is exactly equal to that of the former. Now a cubic inch of lead weighs more than eleven times as much as a cubic inch of water; hence, in order that the lead may become suspended in the water, the latter must be so compressed that eleven and forty-five hundredths cubic inches shall occupy the space usually occupied by one cubic inch. Such a degree of compression can scarcely be conceived of as possible. A pressure of some hundreds of tuns to the square inch is required to reduce the volumn of a column of water five per cent, or one-twentieth of its bulk; while the pressure on a square inch at a depth of nine miles (the estimated depth of the ocean, in its deepest part), would be less than eleven tuns. But we are told that the lead does refuse to sink at a depth of about three miles, where the pressure does not exceed three-and-a-half tuns to the square inch; and, consequently, the specific gravity of the water can not be sensibly greater than at the surface.

"We come now to the perplexing question: 'Why, then, does the lead refuse to sink at great depths?'

"Of course, we take for granted, that the fact stated by seamen, who alone have had opportunity to state the same, is real—that the lead does actually refuse to sink, when it has reached a certain depth, though it has not yet reached the bottom. We have just seen that this fact can not be accounted for, by supposing that the water, at that depth, has become, specifically, as heavy as lead; for this supposition is contrary to what we know of the effect of pressure on water. Nor do we know of any well-established principle, by which this result can be accounted for.

"It can do no harm to offer a conjecture, which may help in solving this difficult question, even if it be not the correct answer.

"We conjecture, then, that pressure has somewhat the same effect on water that it is known to have on some of the gases; namely, that it reduces it to a solid form. We know that a reduction of temperature has this effect; and that water, in the solid form of ice, is not even so heavy, specifically, as in the liquid form. Now, pressure may, possibly, reduce it to the form of a solid, without any perceptible increase of specific gravity, and three or four tuns to the square inch may be the amount of pressure required to accomplish this result. It is also possible, that the solidifying process may be more or less gradual, which would prevent any sudden jarring of the lead on reaching the solid stratum of water."

We should have been loth to concede that the belief in the theory, that a weight of greater specific gravity than water would fail to sink to any depth which can be found in the ocean, prevailed to any great extent but for this singular hypothesis. It is fair to suppose that the public is not wiser than its teachers, and we therefore suppose this belief is one of those popular errors which still remain uncorrected. With a view of correcting it we shall first analyze the theory itself, and show that it is neither sustained by fact or reason; second, show the absurdity of the hypothesis framed to account for it; and third, as a matter of general interest, make some remarks upon the difficulties in deep sea sounding which undoubtedly gave rise to the error.

The theory is not based upon fact. Lieutenant Berryman, of the steamer Arctic, in 1857, in sounding the depths of the Gulf Stream, reached bottom at 4,480 fathoms, more than five miles, and in one case 6,600 fathoms, a depth of seven and one-half miles, were reached without touching the bottom. Some deductions are to be allowed for possible errors in perpendicularity, but they must be small in proportion to the general result.

Admitting that these facts do not prove that at still greater depths a point might not be reached where a body heavier than its own bulk of water would cease to sink, the consideration of the nature of that fluid itself forbids the supposition. The most elaborate experiments have been instituted to determine the compressibility of liquids, and it is even yet doubted by some whether the amount of compressibility which has been apparently determined, is not due to defects in the method of experimenting. Be that as it may, it is probably true that no solid is so little compressible as water It follows, therefore, that even if water were capable of being condensed so as to become of the density of lead under ordinary conditions, that a solid immersed in it and receiving the same pressure would also be condensed, and its specific gravity increased proportionally. Thus a body, if it begins to sink at all in water, must continue to sink until it reaches the bottom, unless the hypothesis that water solidifies under pressure be correct.

We have no reason to believe that this hypothesis is correct. On the contrary we have many reasons to disbelieve it. All experiment teaches us that when any gaseous or liquid body is rendered solid, it does not instantaneously resume the gaseous or liquid form. It must absorb the amount of heat which it lost when it became solid, it being a law that bodies when they become denser impart heat, and when they become less dense absorb it. It takes time in all cases to accomplish this, and the larger the mass operated upon the longer time it will take. In former ages the bottoms of oceans have been upheaved. In every case where upheaval has occurred we find a fossil deposit which has been proved to be organic in its origin. How would this be possible if the water at the bottom were in a solid state? If that were so, large masses of this solidified water would have been upheaved, having all this deposit upon its upper surface, the gradual change to a liquid state would have generated rivers, whose force would have broken up and carried along the fossil deposit, and distributed and arranged it in forms strikingly different from that in which it is always found. Moreover, it is impossible if this solid state exists anywhere in the sea, and especially if it is solid at the depth of three miles, that such depths could have been reached as we have stated were reached by Lieutenant Berryman. In all the experiments to which water has been subjected, there has never been the least indication that it could be solidified by pressure, and it is most improbable that if it were possible such indications should have totally escaped notice. But as we have shown that there was no need for this supposition, as the supposed fact for which it was intended to account does not exist, we will pass to what was probably the origin of the error.

The difficulties in sounding great depths are very great. Formerly the twine used was so light that when a certain depth was reached its buoyancy was sufficient to float the lead. It became on this account necessary to improve its quality and density so that its specific gravity should not vary greatly from that of sea water, while at the same time it should have enough strength to sustain the weight used in making the cast. Twine was thus perfected until it was able to sustain a strain of sixty pounds without breaking, six hundred feet weighing only one pound. With this twine having a 32-pound shot attached, very much greater depths than had been previously possible were reached. Small wire has been used in lieu of twine, and we believe the line used by Lieutenant Berryman in the soundings above alluded to was partially composed of wire. The second difficulty was the determining the precise moment at which the weight reached the bottom. It was found that when the ball had reached the bottom the line would continue to run out, being acted upon by the force of deep sea currents. The shock could not be felt at great depths, and thus it was necessary to devise some method by which this important detail should be made determinate. If a line be made fast to one side of a river, carried across and allowed to trail in the water, it will run out rapidly from the side where it is not fastened. In sounding when the ball reaches the bottom, the same thing occurs. The ball becomes immovable while the under currents acting upon the line carry it rapidly out. So long as this difficulty remained nothing certain could be ascertained. And still another difficulty was discovered. The counter currents made bights in the line, so that the length of line run out was not a correct indication of the depth reached. These difficulties were overcome by the inventions of Brooke and of Massey. The former invented a self-detaching apparatus by which the weight

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when it reached the bottom would be instantly released. At the same time a small portion of the bottom would adhere to light hollow tubes attached to the line, so that when recovered the character of the bottom could be ascertained. The latter invented a small instrument by which the exact vertical distance traversed by the weight in its descent would be indicated. The form of the lead was subsequently changed to a double cone about two feet in length, having its greatest diameter four inches from the lower end, and tapering from this point to the top, where it was about two inches in diameter. Through the center of the lead, which weighed from one hundred to one hundred and fifty pounds, an iron shaft extended. In a hollow at the lower end pieces of quill barrels were inserted, which penetrating into the bottom retained a portion. When this apparatus was used on the steamer Arctic by Lieutenant Berryman, the detaching apparatus of Brooke was dispensed with as Massey's sounding machine was sufficient to determine the depth when enough line was run out to render it absolutely certain that the bottom been reached. Delicate self-registering thermometers were also attached to the apparatus, by means of which it was ascertained that the sea was much colder at greater depths than near the surface. With this apparatus the deep soundings we have described were made, and there is no doubt that they were very nearly correct.

CHROMO LITHOGRAPHY.

Without admitting all or nearly all that is claimed for it, we must admit that chromo-lithography is a wonderful art. It is not necessary to believe that the chromos so much praised by some of our exchanges are exact copies of the paintings they represent, to properly estimate their worth An exact copy of a painting was never yet produced; nor yet so nearly produced as to obtain the full effect of any truly great picture, whether it was done by the most skillful painter or by chromo-lithography. It is enough that a well-executed chromo is better than a badly painted copy, for most of the painted copies are bad. Chromo-lithography gives a good picture at a cheap rate, for which it is justly entitled to praise. The process is a difficult one, although the principles upon which it is based are simple enough. The effects most difficult to produce in chromo-lithography are those which are produced in painting by the blending of colors while they are fresh and soft on the canvass. This blending can never be produced in any other way so perfectly as the artist can do it with his brush, and it is the comparative absence of these effects which enables an expert to detect, even at some distance, a chromo from an oil painting. In the former, the colors are superimposed; in the latter, they are mixed.

Lithography is the art of drawing upon stone, and taking impressions of the picture thus produced upon paper. The prefix *chromo* signifies colored. The art, as practiced in Europe, and, until lately in this country, is entirely distinct from engraving. The stones from which the impressions are taken being perfectly *smooth*. Latterly, the last impression is taken from an engraved stone, by which a nearer approach to oil painting is secured. This improvement is due, we believe, to Mr. Prang, of Boston, and has greatly added to the artistical effect of the pictures.

The stone used is a peculiar species of limestone found in Bavaria, which is capable of receiving a very fine polish, beside possessing chemical qualities which render it adapted to the purpose. The stone is cut into plates of the proper size, as many plates being requisite as the different colors necessary to complete the picture. Each of these plates has a separate portion of the picture drawn upon it. The drawing is executed with a colored chemical preparation, which, upon the subsequent application of suitable re-agents enters into combination with the stone itself, and becomes permanent. The drawings are so made, that were they all superimposed upon each other, and the plates were transparent, by looking through them, the entire picture would be shown complete. The lines which constitute the drawing have an oily surface which repels water, so that when the stone is dampened with water, and printers' ink or oil colors are applied, the ink or the colors, being repelled by the moistened parts of the plates, adhere only to the lines of the drawing. Thus, when an impression is taken, these lines only are transferred to the paper.

Every stage of the operation requires the most delicate and accurate manipulation. Conceive the difficulty of making a drawing on thirty different plates, each plate having upon its face numerous fragments of the entire picture scattered in different positions, the whole to be so accurately done that when one after another shall have been proved by an impression taken upon a single sheet of paper, a complete picture will be presented; and remember that a variation of a hair's breadth will destroy the work. Another difficulty is what is technically known to printers as registering. This means the placing of any number of sheets, always in the same position, upon the plate or form, in the press. The greatest accuracy is required here, as all the preceding nicety of workmanship counts for nothing unless this is secured.

The final operations consist in embossing and varnishing. The former gives the rough grained appearance to chromos which is seen in oil paintings, and softens the outlines of the picture. This brief sketch will give an idea of the methods employed in this art, which, if it can not equal, is familiarizing the American public with the works of the great artists, hitherto entirely inaccessible to those not having the means and opportunity to visit the galleries of Europe, where the most of them are only to be found.

THE smoke from the late volcanic eruption on the Sandwich Islands floated off in a line of one thousand miles across the sea, and was so dense that at a distance of 500 miles officers of ships were prevented from making their observations.

Submarine Telegraphy—A Curious Phenomenon.

The Memphis *Appeal* gives an account of a case which has very much perplexed the electricians. We allude to the late obstruction and restoration of telegraphic communication with the trans-Mississippi. For some weeks past the cable has been working very irregularly. At intervals no communication could be had for hours, and all at once it would revive and the fluid pass through it as usual. This state of affairs continued for several weeks, and at last communication ceased entirely. After several ineffectual attempts to revive it, it was determined to raise it and find out the reason for the cessation. The cable crossing at this point is considered one of the best ever laid in this country, having been manufactured originally for the Red Sea, but for some reason not used, and afterwards was purchased and laid down by the Western Union Telegraph Company, at a very heavy expense. The operation of "under running" and taking the cable up was successfully performed by Colonel Coleman and Captain Baker, in a steam tug with a barge attached. As it was raised, and at intervals of a few yards, a needle was driven into the cable so as to touch the conducting wire, and instruments were applied to test the soundness of the portion raised. When near this shore by this means it was discovered that the disturbing cause lay within a space of twenty yards between two points. This piece was cut out, the two ends spliced, and the cable immediately worked throughout its whole length. The piece cut out was brought ashore and examined by Colonel Coleman and Captain Baker at their leisure, and developed one of the most singular facts in telegraphing that has ever come under their notice. On cutting the cable it was found that about four inches of the conducting wire had been burned out, and was gone completely. It is supposed that a severe shock of lightning had passed along the land line of wires, and had left them and followed the cable, burning this piece out in its passage. The curious and inexplicable part of the affair is the action of the cable after the burning. At times a current of electricity passed through and communication was kept up between Memphis and Little Rock; then ceasing entirely for awhile, it would again revive, keeping up this fitful action, as we have stated, for some time before its total suspension.

Many theories and surmises are advanced by the gentlemen connected with the telegraph office here as to the explanation of this remarkable phenomenon, the only one of which is at all satisfactory is that of Colonel Coleman, that "a slight connection was formed between the burnt ends of the conductor by moisture which had penetrated the cable in sufficient quantities to keep up the circuit there being a battery on the Memphis end strong enough to drive the electricity through at intervals." This, says Colonel Coleman, to whom we are indebted for most of the above facts, is a remarkable case and may never occur again. The question now naturally suggests itself, cannot some mode be established whereby communications can be passed through large bodies of water without a cable? It has been proven it this instance that messages passed to and fro across the Mississippi without a metal connection. Let the scientific work it out.

Sleep—The Amount Necessary.

Prof. Dickson, in his Essay on Sleep, says the necessary amount must differ in the various tribes, as well as in different individuals, according to numerous and varied contingencies. The average proportion of time thus employed by our race may be stated pretty fairly, I think, at one third. The allotment of Sir William Jones, slightly altered from an old English poet, does not depart much from this standard:

"Seven hours to books, to soothing slumber seven,
Ten to the world allot, and all to Heaven."

The busy engagement of ambition and avarice may induce men to subtract more or less from their due repose, but any considerable deduction must be made at a great risk to both mind and body. Sir John Sinclair, who slept eight hours himself, says that in his researches into the subject of longevity, he found long life under all circumstances and every course of habit; some old men being abstinent, some intemperate; some active, and some indolent; but all had slept well and long. Yet he gives a letter from a correspondent, recording the case of an old man of ninety-one years of age who had slept through life but four hours a day. Alfred the Great slept eight hours, Jeremy Taylor but three. Dr Gooch tells us of an individual who slept only fifteen minutes in the day; but it is scarcely credible. Bonaparte, during the greater part of his active life was content with four of five hours' sleep; the same is said of Frederick the Great and of John Hunter. I know familiarly a person whose average has been even lower than this; I have heard his wife say that they were married four years before she had ever seen him sleep. Seneca is quoted as telling the incredible story of Mecænas, that he had passed three years without sleeping a single hour. Boerhave says of himself that he was six weeks without sleep, from intense and continued study. Statements like these demand close examination and clear proof.

Of long protracted sleep there are numerous and wonderful tales, from the story of the Seven Sleepers of Ephesus and their dog—to be found in the early legends of the Church; in the Koran, chapter of the Cave; all over the East, as Gibbon tells us; and even in Scandinavia—down to the exquisite Rip Van Winkle of our Washington Irving. In the *Philosophical Transactions* we read of one Samuel Clinton, a laboring man, who frequently slept several weeks at a time, and once more than three months without waking. In the *Berlin Memoirs of the Academy of Sciences*, there is a curious history of a lady of Nimes, who fell asleep irresistibly at sunrise, woke for a brief interval at noon, fell asleep again, and continued in that state until seven or eight in the evening, when she awoke and remained awake until the next sunrise.

Heat in Mines.

Every one who has had anything to do with mining knows that water is one of the most formidable enemies the miner has to contend with. It begins to flow in as soon as the depth of an ordinary well is reached, and must be pumped out, at great expense, to enable the work to proceed. The steam engine was first devised for the sake of providing power to do this pumping, and was for a Cornish mine that Watt invented his great improvement on the original machine.

Without this help many of the mines in England would be worthless; and as it is, some of them are limited in their depth by the difficulty and expense of getting rid of the water.

A curious fact has, however, been lately brought to notice in regard to the Nevada silver mines. Heat, not water, is the chief enemy encountered after reaching a great depth, and, instead of pumping out water, the companies have to pump in air. A Nevada paper says:

"The increase in the heat of our mines is now beginning to give many of our mining companies more trouble, and is proving a great obstacle to mining operations in those levels lying below a depth of one thousand feet than any veins or 'pocket' deposits of water yet encountered. A number of the leading companies on the Comstock are now engaged in putting in engines to be used expressly for driving fans for furnishing air to the lower levels, forcing it through large tubes of galvanized iron. With this great increase of heat in our mines comes a great decrease of water; in fact, in our deepest mine—the Bullion, which has attained the depth of twelve hundred feet—not a drop of water is to be seen; it is as dry as a lime-kiln and as hot as an oven. In the lower workings of the Chollar-Potosi mine, which are a perpendicular depth of eleven hundred feet below the surface, the thermometer now stands at one hundred degrees—a frightful heat to be endured by a human being engaged in a kind of labor calling for severe muscular exertion. Here also we find the water to have decreased till there is at the present time a very insignificant amount, it being necessary to run the pump but four hours out of the twenty-four."

This corroborates the theory of some geologists, that the interior of the earth is a mass of melted rock. Suppose one of these Nevada miners should accidentally make a hole in the solid crust, what would become of him?—*Sun.*

Editorial Summary.

THE largest tannery in America is claimed by Chicago. It belongs to the Union Hide and Leather Company. An exchange thus describes these works: They are situated on the north side of the Chicago River, and occupy nearly 5 acres, including docks The main building is 241 by 80 feet and 3 stories, and on this is a two storied superstructure 75 by 35 feet. The building is constructed without angles, inside, so that every workman is under the eye of the foreman. A steam elevator in the center of the building is used for hoisting purposes. The working force of the establishment is 100 hands, and its producing capacity 1 000 hides per week, including wax, buff and upper leather, and a small quantity of harness leather. About one half of this product is sold in Chicago, and one half in Boston. The beam-house is 140 by 41 feet, and the machinery in use comprises 3 Winn splitting machines, 2 scouring and 1 stuffing wheel, 1 hide mill, pumps, etc. The building is heated by means of 12,000 feet of 1¼ inch pipe.

A DESCRIPTION of a clock which is apparently only a single plate of glass having the usual figures of the dial upon it, and a hand which keeps the time with apparently nothing to move it, is circulating largely among our exchanges. This is probably no new contrivance but an imitation of the celebrated glass clock constructed by Houdin, the French *prestidigitateur* many years ago, which was so ingeniously devised, that a person looking at it ever so closely could not discover the works, although he might to all appearance look entirely through the entire apparatus and see all the objects upon the opposite side of it.

A LARGE meat in a very hard nut to crack was found by some burglars recently in San Francisco. A safe which resisted their attacks for a long time and demanded all their skill as cracksmen, at last yielded, and was found to contain a large—joint of cold mutton. This, with a few other cold edibles, comprised the entire contents, the safe having been used for some time as a refrigerator.

A VENERABLE plow is announced for exhibition at the Maine State Fair It has a seven-foot beam of white oak, a stout iron colter, an oak share sheathed with iron, and a pair of ash handles, like immense davits, projecting four feet in the rear. The wood is seamed and wrinkled, but tough and sinewy still.

DURING the recent laying of the siphon under the Seine at Paris, one of the divers employed remained at the bottom so long as to excite the alarm of the attendants. The bubbles which arose indicated that he was alive and remaining stationary, but he could not or would not reply to signals. Another diver was sent down, who found his predecessor gloriously drunk, and enjoying a cosey nap upon the bottom of the river.

THE Rappahannock Canal was recently sold for the paltry sum of $1 500. It had ceased to be of any value as an internal improvement.

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MANUFACTURING, MINING, AND RAILROAD ITEMS.

English Railways now run smoking cars on all passenger trains.

Houston, Texas, claims that she is destined to be the great railroad center of the South.

Cleveland is trying the experiment of concrete pavement between the rails of her horse railways.

The Egyptian cotton crop is reported for this year as 400,000 bales, against 250,000 for last year.

A quarry of stone, said to be equal to the best French burr for millstones, has been discovered near South Pass in Southern Illinois.

North Germany has now six iron clads, carrying in all seventy guns. Its entire naval force is 563 guns.

Pennsylvania has 4,311 miles of railroad; Ohio 3,398 miles; New York 3,345 miles; Illinois 3,224 miles. In 1860 Pennsylvania had only 2,508 miles.

The *North American* says a project is on foot to effect steam communication by water between Ohio and the Gulf of Mexico, at Mobile, passing through the Tennessee river past the Muscle Shoals, and connecting with the Coosa river by a steam canal thirty miles long.

Three hemp cables have just been completed at the Chatham dock yard for the British navy each twenty six inches in circumference, one hundred and one fathoms long, and weighing 13,000 pounds.

The Philadelphia *North American* says the Union Pacific Railroad is forwarding ninety car loads of construction material to the end of the track daily. A large number of snow plows have been placed at convenient distances in the mountains ready for use.

Before the war nearly 2,000 men were employed in various occupations in the Norfolk Navy Yard, while at the present time the number does not exceed 400.

The Hartford and New Haven Railroad Company are erecting gates on each side of the railway crossing on Main street, Meriden, to prevent loss of life and property, which hitherto have been constantly endangered.

During the first half of the present year France imported raw cotton to the amount of 230,384,125f., more than half of which came from this country The exportation amounted to 39,461,604f

The manufacture of smoking pipes in France has followed the ever-advancing increase of tobacco consumption, and represented in 1867 upwards of fifty-two millions of francs.

The deep-sea dredging expedition, in which Dr. Thomson, of Belfast, and Dr. Carpenter and son, of London, were engaged, is reported as having been generally successful. Some new species of submarine animals have been discovered.

Ten cars of the Atlantic and Great Western Railway were destroyed by fire recently. The fire was caused by an explosion in the forward car which is supposed to have contained nitro-glycerin. The engine was completely demolished, and the engineer seriously wounded, and the fireman slightly hurt. The cars were loaded with flour and pork. A house, a quarter of a mile from the wreck, was demolished by the concussion.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

STEAM BOILER.—John L. Thomas, Alliance, Ohio.—This invention consists in indicating the hight of water and the steam space by a revolving dial wheel operated by a chain and float, the motion of which wheel also operates a cock in the feed-water pipe, so as to control the quantity of water which is admitted into the boiler.

HORSE HAY RAKE.—Geo. C. Shaler, Gilboa, and Harry Barlow, Herbert, N. Y.—This invention relates to a new and useful improvement in horse hay rakes, the object of which is to rake and dump the hay or grain in heaps without scattering, and at the same time to keep the teeth of the rake clean and free from being clogged or chocked.

FANNING MILL.—George Richards and David Strickland, Richland Center, Wis.—This invention has for its object to improve the construction of fanning mills, so as to make them more convenient and effective in operation.

HAME FASTENER.—Wm H. Payne, Janesville, Wis.—This invention has for its object to furnish an improved hame fastener, simple in construction, durable, easily attached and detached, and which will hold the hames securely fastened.

CALORIC ENGINE.—H. D. Wallen, Jr., Fort Columbus, New York city.—The object of this invention is to provide a hot air engine which will work with better results than those heretofore made. The general features of the invention consist in the employment of two parallel cylinders, each cylinder being provided with air-heating chambers at each end. The cylinders communicate with each other through suitable ports opening from the heating chamber of one cylinder into the adjacent heating chamber of the other, and these ports are provided with valves, the timely operation of which is accomplished by suitable valve gear. The pistons are made by means of any suitable "lost motion" devices to move and rest alternately; one piston being at rest either at the top or bottom of the stroke, while the other piston is making the stroke towards the resting piston. This action allows time for the air to be received into and heated in the air chambers at either end of the cylinders, which is a prominent feature of the invention. Another advantageous feature is obtained in the utilization of the excess of pressure in the first cylinder to assist in actuating the piston of the second or auxiliary cylinder, whereby the expanded air of the first cylinder escapes into the second heating chamber and by its pressure assists to actuate the second piston to make its stroke while the first piston is resting.

HEATING ATTACHMENT FOR STOVES.—John Norris, Mount Pleasant, Md.—This invention is an improvement upon the "Ten-plate Stove," and consists in constructing one of the oven doors of the same with a bay, from the top of which projects a short tube or collar, which conveys heated air to the upper apartments of the house, by means of suitable pipes, and also, when the pipes are removed, serves for certain culinary purposes.

WATER AND STEAM VALVE AND CYLINDER.—Richard Gornall, Baltimore, Md.—In this invention the cylinder valves are worked by the direct action of the live and exhaust steam, without the intervention of tappets, eccentrics, cams, or any other device outside of the steam chest and cylinder.

FOLDING CHAIR.—Asahel C. Boyd, Grafton, Mass.—The object of this invention is to construct a simple, cheap, and light chair, which can be instantly folded into a very small compass, for convenience in packing, transportation, etc.

SOLDERING FURNACE.—Conrad Seimel, Greenpoint, N. Y.—This invention consists in a mechanism in which solder may be heated, and provided with an arrangement for supporting vessels in a convenient position for applying solder.

HEATER.—C. S. Doolittell, Mansfield, Ohio.—This invention has for its object to improve the construction of stoves, furnaces, and other heaters, in such a way as to utilize a larger proportion of heat than is possible with heaters constructed in the ordinary manner.

GRAVE MOUND.—Jonathan Meley, Trenton, Tenn.—This invention has for its object to improve the construction of grave mounds, so as to make them ornamental, and especially so that the mound may not be disfigured by the sinking of the grave.

CHURNING APPARATUS.—Edward J. Moore, Westfield, N.Y.—This invention has for its object to improve the construction of the improved churning apparatus patented by the same inventor April 17, 1868, and numbered 76,497, so as to make it more convenient and effective in operation.

ANIMAL TRAP.—Wilson McClure, Sinking Spring, Ohio.—This invention has for its object to furnish a simple, cheap, and effective trap, by means of which the animal may be killed when caught.

COMPOSITION FOR BUILDING BLOCKS, PAVEMENT TILES, ETC.—Samuel E. Carr, Danville, Pa.—This invention has for its object to furnish an improved composition for forming building blocks, pavement tiles, and for other similar purposes, which shall be cheap and durable, forming a hard and permanent structure.

LOCKING JOINT FOR HORSE HAY FORKS.—C. A. Howard, Pontiac, Mich.—This invention relates to improvements in locking joints for horse hay forks, and has for its object to provide a more simple and convenient locking joint than any now in use.

PACKING CAN.—N. P. Lindergreen, Boston, Mass.—This invention relates to improvements in packing cans, the object of which is to provide cans of the best form for packing, which shall at the same time be strong and durable.

MATCH COMPOSITION.—Wm. H. Rogers, New York city.—This invention relates to the use of new materials or ingredients for composing friction and other matches, whereby the match is made self igniting and combustible throughout its whole length, and whereby the match is made flexible and may be coiled like cord or wire in a small space.

LINE HOLDER.—D. W. C. McMaster, Southborough, Mass.—This invention relates to a device for holding clothes lines, cords, or ropes used for other purposes.

EVAPORATOR.—James Taylor, Canton, N. Y.—This invention relates to the evaporation of sap for making maple sugar, for evaporating the juice of the sorghum for making sirup or sugar, and of salt water in making salt.

COMBINED SQUARE AND BEVEL.—E. B. Foster and John G. Witt, Elmira, N. Y.—The object of this invention is to furnish on one article (or tool) a combination of various useful tools which are indispensable in the mechanic arts.

JOINT OR SEAM FOR SHEET-METAL BOXES.—E. A. Thomas, Philadelphia, Pa.—This invention relates to a new and improved joint or seam for joining the edges of the piece of sheet metal, which forms the body or main portion of a box or can. The object of this invention is to obtain a side seam or joint which may be made very expeditiously and perfectly tight.

FENCE.—J. M. Chaplin, Middleport, N. Y.—This invention relates to a new and improved fence of that class in which the pickets are attached to wires. It also relates to a new and improved manner of straining the wires and in attaching the pickets thereto.

HAY FORK.—C. H. B. Kellogg, Tontogany, Ohio.—This invention relates to a new implement to facilitate the handling of hay, and it consists in expanding and contracting hooks, or tines attached to a central movable rod.

WATER WHEEL.—Gardner Cox, Pierpoint, N. Y.—This invention relates to a new and improved water wheel, of that class which are secured to a vertical shaft and consequently rotate in a horizontal plane.

DUMPING WAGON.—G. R. Sneath and C. H. Sneath, Wilmington, Del.—The object of this invention is to provide a simple and effective dumping wagon. It consists, in general terms, of a wagon body, or box, arranged to tip backwards on a trunnion shaft, having bearings in the bed frame properly supported upon springs, together with other devices, the said bed frame being braced and provided with devices for relieving the trunnion shaft from the weight of the body or box when the latter is in its horizontal position on the bed frame.

AIR SPRINGS.—Jackson Corriston, Sandusky City, Ohio.—This invention relates to improvements in air springs for use on railroad cars, or for any other purposes for which they may be found useful. It consists of springs composed of a series of concave perforated sheet metal diaphragms, arranged in pairs reversely to each other, united together alternately at their outer and inner edges, and joined together at each end to concentric disks, and provided with an interior guiding tube secured to one end, and a plunger secured to the other end, which works in the said guiding tube, the two serving as a guide for the proper action of the spring while in use, and to prevent a collapse of the same if an opening should occur through which the air should escape. It is also provided with a valve for admitting air, and for closing to prevent the escape of the air after the spring has been filled.

PUMP.—C. H. Dreyer, Nashville, Tenn.—This invention relates to improvements in pumps, the object of which is to provide an improved double acting pump.

FEEDING ROLLER FOR EDGING SAWS.—E. C. Dicey, Montague, Mich.—The nature of this invention relates to improvements in feeding rollers for edging saws, and other similar purposes, whereby it is designed to counteract any tendency of the saw to draw the board out of a straight course.

PLOW.—M. Berdan, Maumee city, Ohio.—This invention relates to a new and improved means for attaching a subsoil share to an ordinary plow, whereby said share may be adjusted higher or lower as desired, and held very firmly in position when adjusted.

MACHINE FOR TURNING BROOM HANDLES.—G. M. Morrow, Clarksville, Ohio.—This invention is a machine for turning broom handles or other rods that require to be tapered, and consists in the employment of cam wheels, which compel the action of the bits together, with other devices perfecting the whole.

WAGON BRAKE.—Simeon R. Bolton, Prescott, Wis.—The object of this invention is to provide a simple and efficient braking apparatus for vehicles.

BABY JUMPER.—Charles Rich, Poughkeepsie, N. Y.—The object of this invention is to construct a baby jumper, so that with a simple apparatus it can be adjusted conformable to the weight of the child, and so that the child can be placed therein securely, that it cannot fall off its seat.

VISE FOR STRETCHING TELEGRAPH WIRES.—Geo. M Thompson, Boston, Mass.—The object of this invention it to construct a device for stretching telegraph wires, so that persons on poles can, with but one hand, apply the instrument and stretch the wire, while with the other hand they can hold fast to the pole

OPERATING PUMPS.—Charles W. Hoyt, South Norwalk, Conn.—This invention relates to a new and improved means for operating pumps and is more especially designed for those cases where the power cannot be conveniently applied in close provimity to the pump.

CAST IRON PIPE CORE.—John Enright, Louisville, Ky.—This invention relates to the construction of cores used in iron foundries in the manufacture of cast-iron pipe, and it consists in forming the core of iron or other metal and in such a manner that the core is made so as to be expanded and contracted.

LEACH TUB.—Wm. Banzett, Brooklyn, E. D., N. Y.—This invention relates to a new manner of securing the cover to a standing leach-tub, and consists in the use of an elastic packing strip, interposed between the edge of the tub and the cover, and of a series of hooks pivoted to the tub by which hooks the cover can be securely clamped upon the tub, yet so that it can be easily removed when desired.

CAKE MIXER.—James Lafetra, New York city.—This invention consists in the use of two fingered stirrers, suspended from the cover of a tub, one of the stirrers being stationary and the other rotating; the stationary fingers project upward from the lower bar of a yoke, while the rotating fingers project downward from a cross bar that is attached to a shaft, having the bearings in the cover. The rotating fingers pass between the stationary fingers and keep the contents of the tub well stirred.

VISE.—John C. Crumpton, Philadelphia, Pa.—The object of this invention is to provide a wrench which may be constructed more cheaply and which will be more durable and convenient than those now in use. It consists in the arrangement of the front jaw, bed piece, and shield for the screw in one piece, also in the arrangement of the sliding jaw in connection with the said bed piece and shield and also in the method of adjustably connecting the vise to the bench.

GAITER BOOTS.—W. H. H. Babbitt, New Corner, Ind.—This invention relates to an improvement in gaiter boots and is confined to the fastening of the gaiter around the ankle and to the parts connected therewith, whereby the fastening is rendered durable and the ankle is properly supported.

STEAM GENERATOR.—V. D. Anderson, Milton, Wis.—The object of this invention is to provide a simple and economical steam generator for domestic uses.

DEVICE FOR UNLOADING HAY.—Joseph Backus Greenvale, Ill.—This invention relates to a device for unloading hay from wagons, if upon stacks, and consists in the construction and arrangement of a derrick, which can be used for the purpose of transferring the hay from the wagon, and in a new device for holding the hay while the same is being transferred from the wagon to the derrick.

BUCKET FOR CHAIN PUMP.—Orrin O. Witherell, Lewiston, Me.—This invention relates to an improvement on that class of chain pump-valves, in which a rubber or other elastic plate or ring is clamped between two metal plates, and the invention consists in the use and arrangement of a screw by which the parts are held together.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. T. R., of Pa.—Eggs may be preserved by packing them in salt, pickling them in brine, or varnishing them by a solution of gum arabic in water. The best way is to apply the solution first, and then pack them in salt The package should be frequently turned to prevent the yolk from settling to one side of the shell.

H. B. L., of Mass.—"Why are rubber diaphragms not adapted to water meters?" Such diaphragms are used, and we have never heard any objection made to their use, except want of durability. Those who use them state that they will last well, provided they are not required to perform much work in the driving of valves etc.

W. H. M., of Pa.—Hollow mills or cutters used for turning studs or stems which cannot be swung in a lathe, are frequently split in hardening from the neglect to drill a small pin hole through one side to the bottom of the drilled cavity to permit the escape of the steam generated in the process. Give this chance for escape and the milling tool will not crack.

A. B. T., of Mass.—You are wasting your time in filing and draw-filing your turning tools. First, because no file finish will stand hardening, tempering, and work, so well as a grindstone finish, and second because a good tool forger ought to make a tool so that it would require nothing but the grindstone.

M. S. P., of Pa.—Wenderoth, the distinguished photographer of your city, makes a varnish suitable for preparing photographic prints to receive colors.

H. C. D., of Mass.—In the proper use of the mouth blowpipe the air is very little vitiated by passing through the mouth. Of course the purer the air, the hotter the flame will be.

C. H., of N. Y.—We decline your communication on the use of sulphuric acid in photography. The suggestions it contains are impracticable. We publish this week an article on lithography. We know of no work that treats of the subject in full, as the art is now conducted,

C. W. M., of N. Y.—To coat iron with zinc or tin, clean with dilute sulphuric acid and a scratch-brush. Wash thoroughly, and immerse it in melted zinc or tin. When tin is used dust the iron with sal amoniac before immersion.

J. H. P., Conn.—A pipe filled with water, having its upper end closed and the lower one open, will not retain water if its diameter is so great that capillary attraction will not keep the fluid column from breaking Neither will water be retained in the long leg of a siphon having the end of the shorter leg closed when the diameter of the pipe is too great. The maximum diameter at which this effect may be obtained varies with the material of the tube and the nature of the fluid. When the tube is of glass, and the bore is about one-tenth of an inch, water will be retained unless the tube be smeared with some substance which repels water. When thus retained, the force which keeps the water in the tube, is chiefly the pressure of the atmosphere upon the exposed end of the fluid column. A column of water cannot be sustained at a hight exceeding 34 feet at the level of the sea.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Blanchard's spoke lathes, address Exeter Machine Works, Exeter, N. H.

Portable pumping machinery to rent, of any capacity desired, and pass sand and gravel without injury. Wm. D. Andrews & Brother, 414 Water st., New York.

The zoetrope the most wonderful and amusing optical instrument ever invented, is for sale by nearly every bookseller.

Adams' air cylinder graining machines for painters and all manufacturers of painted ware. Machine guaranteed. Send stamp for circular to Heath, Smith & Co., 400 West 15th st.

Water powers for sale, 90 miles from New York, on railroad, Will take interest in manufactory in part payment. H. Stewart, Stroudsburg, Pa.

Wanted—machinery to spin and weave cotton and wool, new or 2d-hand. Address, with circular and price list, A. O. Williams, Marcella Falls, Tenn.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Second-hand engine lathes, and one upright, used but little, for sale cheap. Hutchinson & Laurence, 8 Dey st., New York.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 8 Dey st., New York.

Manufacturers wanted to build Ball's Ohio reapers and mowers. For terms and territory apply to J. A. Saxton, Canton, Ohio.

For sharpening all kinds of woodsaws, beyond anything heretofore known, inclose 50c., and address E. Roth, New Oxford, Pa.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glazier's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 64 Nassau st., N.Y.

N. C. Stiles' pat. punching and drop presses, Middletown, Ct.

For sale—the patent right, in Great Britain, for perforated saws The manufacture of these saws is now firmly established in the United States, and they are rapidly taking the place of all other solid saws. Apply to J. E. Emerson, Trenton, N. J.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' anti-incrustation powder, 11 Wall st., N. Y. 20,000 references. No foaming. No injury. 12 years in use. Imitations plenty.

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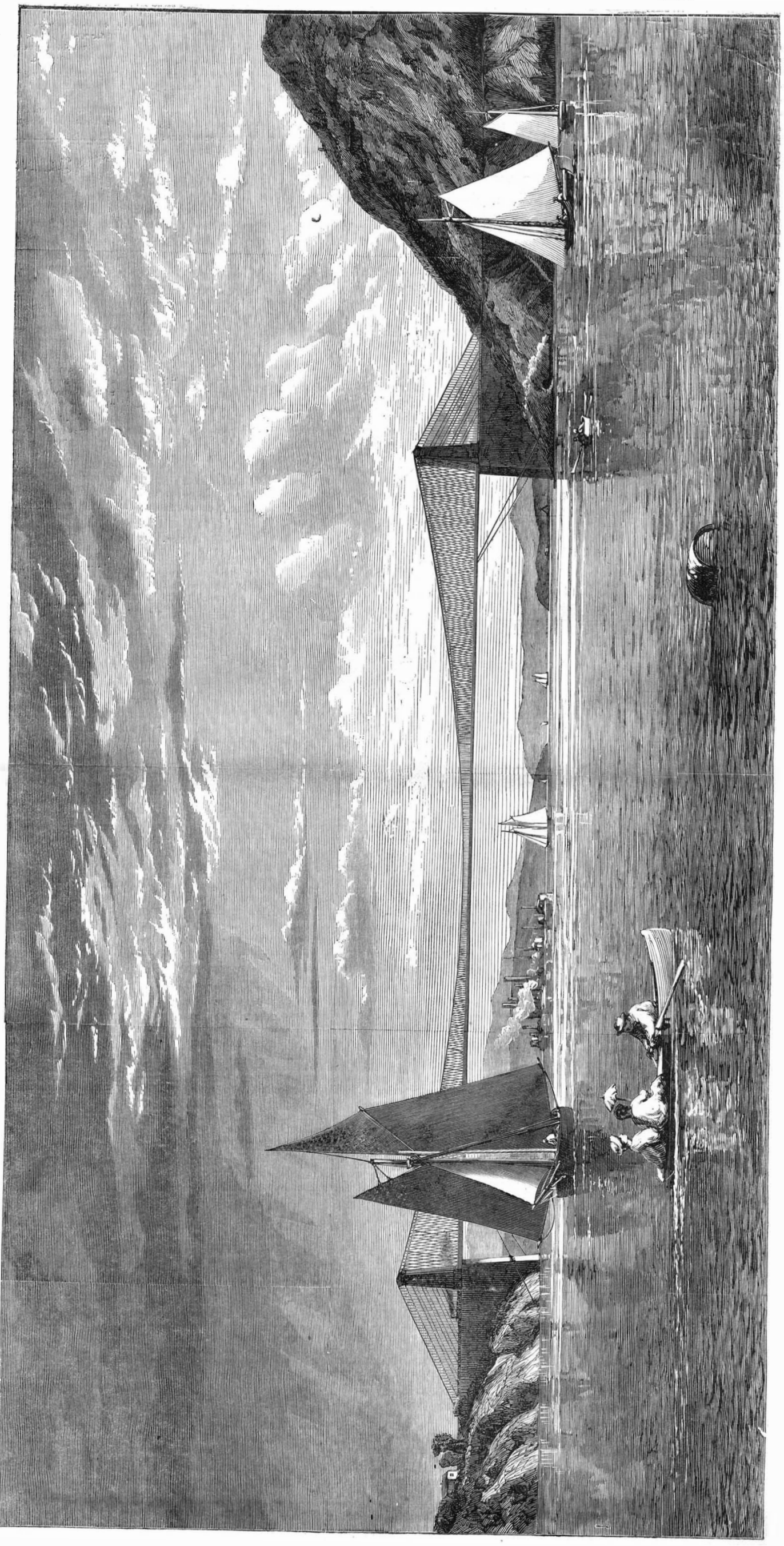
Proposed Railroad Suspension Bridge Across the Hudson River.

Our engraving presents a view of the new suspension bridge proposed to be thrown across the Hudson River to connect the great West directly with New York and Boston. The engraving was taken from the drawings of General Edward W. Serrell, the engineer-in-chief of the bridge company. On the 8th of this month the board of engineers and directors made an excursion on the river to examine for a proper site. The precise locality has not yet been determined, but it will be somewhere between Verplank's Point and Buttermilk Falls. The proposed bridge is one link in the railway intended to connect the Erie road with railroads on the east side of the river. The road will run from Turner's, on the Erie railroad, to Derby in Connecticut.

The following are some of the dimensions of the proposed bridge: Clear span, 1,600 feet ; length of bridge between the towers, 1,665 feet ; total length, including approaches, 2.499 feet ; height of bridge above high-water, 155 feet ; height of towers above the water, 280 feet ; working safe load for the railroad lines, 2,400 tuns ; working safe load for the highways, 2,880 tuns ; total safe load for the bridge, 5,280 tuns ; load that would break the bridge, 25,171 tuns ; miles of steel wire in cables, 70,302 ; total weight of iron and steel in the bridge, 17,005 tuns ; total amount of masonry, 58,084 cubic yards ; total suspended weights, 9,651 tuns.

There will be twenty cables, in four systems ; each cable will be 14 inches in diameter. The bridge will carry at one time 32 passenger cars : it would carry safely 34,560 people and 60 locomotives, if they could be placed upon it at once ; 18,000 people and 53 locomotives would fill it. From the dimensions given above, it will be seen that this bridge will be longer than any one yet built on the continent, though a span of 1610 feet is projected in the bridge undertaken to be built across the St. Lawrence at Quebec.

These figures will show the enormous strength it is proposed it shall possess. New York city and every part of the country, east and west, are interested in it, and it is to be hoped the work upon the ground will soon be entered upon vigorously.



SUSPENSION BRIDGE OVER THE HUDSON.

East Indian Opium.

At Patna is one of the two great opium factories of India. It is the greater of the two, and may, therefore, be safely styled the largest poisoning agency in the world. The establishment faces the river Ganges, whose bed is here four miles across—at this season a desert of caked mud, with the river faraway on the other side of the waste. The opium is shipped to Calcutta in a steamer, and it is a good instance of the fickleness of Indian rivers—those plagues of engineers—that last year, and for many years before, the sacred stream ran so close to Patna, that wharves were erected from which the chests could be put right on the steamers, and where the timber wherewith to make the next year's chests could be landed. This year the chests have to be carried a mile or so before being shipped.

This opium-packing for 1867 was just over at Christmas, and nearly 30,000 chests of China opium had been sent down to Calcutta, worth about £4,000,000. Each chest contains 40 cakes—the dark, sticky stuff, ingeniously inclosed in a coating of dried poppy-leaves, so that each cake (weighing about two pounds) presents the appearance of a Dutch cheese or a cannon-ball. It has given rise to the saying that in war the British gave the Chinese cannon-balls of iron, and in peace cannon-balls of opium, thus giving them the choice of being shot or poisoned, and making them pay smartly for either attention. In return for this, they feed us with tea and clothe us in silk, which seems to show a truly celestial spirit.

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Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.
☞ "The New York News Company," 8 Spruce street.
☞ A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.
☞ Trubner & Co., 60 Paternoster Row London, are also Agents to receive subscriptions.
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VOL. XIX., No. 18...[NEW SERIES.].... *Twenty-third Year.*

NEW YORK, WEDNESDAY, OCTOBER 28, 1868.

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NEW AND IMPORTANT PATENT OFFICE RULE.

Commissioner Foote, in his firm purpose to break up certain practices in vogue in the Patent Office, has promulgated a very stringent and important rule, which ought to be understood by all inventors who intend to apply for Letters Patent.

It has hitherto been the custom of the Office to permit applicants, or their attorneys, to withdraw papers either before or after a rejection, for the purpose of making amendments. Hereafter this practice will not be allowed. Papers once filed must remain in the Office, and are not to be inspected for any purpose whatsoever, either by the applicant or his attorney.

The rigid enforcement of this rule renders it doubly important that specifications and drawings should be carefully prepared, in the first instance, by experienced and competent attorneys, and not by those who have little or no knowledge of the rules and practices of the Patent Office.

We admit that the new rule will operate somewhat severely upon such inventors as do not feel able to employ an attorney, yet we doubt not Commissioner Foote has had good reasons for promulgating the rule.

A BRITISH AMERICAN INTER-OCEANIC RAILWAY.

One of the papers read before the British Association related to a proposed railway to cross the American continent on a line lying wholly north of the United States. The author of this paper, Mr. Waddington demonstrated that the Pacific Railroad now so rapidly approaching completion would eventually throw the entire carrying trade between Europe and the East into the hands of the United States unless competitive measures were adopted. The only means of preventing such a result are in his opinion the immediate construction of a rival railway through the British possessions. The line he proposes, is from Ottawa to Fort Garry, 1165 miles; thence to Jasper's House, a further distance of 1,100 miles, thence by the Yellow Head Pass, 620 miles to the head of Bute Inlet opposite Vancouver's Island; the entire distance being 2,885 miles. He gives as a rough estimate of the entire cost of the road, rolling stock, stations, etc., the nice little sum of one hundred and thirty-five millions of dollars. But the cost is not to be considered as a serious matter when the results are properly estimated. Here is the argument:

"We shall be told that such an outlay is far too great to be thought of. But what we have to consider is not merely the amount, but the object to be attained, and whether that is commensurate with the outlay. If the commercial supremacy of England is at stake—and that has been pretty clearly shown— what are twenty million pounds sterling compared with the sad downfall which must inevitably follow such a loss, and the decay and ruin of our country? Never was so large a sum more usefully, more wisely applied; and in vain might we ransack the history of our national debt to find a parallel. In times past a single subsidy to some Continental potentate has cost more."

The history of the national debt of England, shows that heretofore no amount of money was considered too large to be used for the assertion of national and commercial supremacy. If then the facts are as stated by Mr. Waddington, there is little doubt that the money would be forthcoming, if the project were proved to be feasible and likely to pay. These are in our opinion big *if's*, and although he claims that the severity of the climate has been exaggerated; that the country between Ottawa and Fort Garry is with a single exception, north of Lake Superior, level and fertile; that the difficulties in crossing the Rocky Mountains though serious can be surmounted, it is impossible for us to conceive how the road could become self-paying, as Mr. Waddington believes, in six years from its completion, if indeed it would ever become so. The past history of railroad enterprises has shown that such projects must be based upon something more than the advantages secured by the location of their termini. There must be enterprise, manufacturing and agricultural facilities along the lines sufficient to warrant increase of freight and travel from intermediate points. The route under consideration has neither of these advantages. Its climate would always prevent its competing with the Pacific Railroad for passengers, and it is too distant from the seaboard to become a manufacturing district. Altogether we think that this road would if built, become the most extraordinary white elephant ever owned by the British Government.

PREHISTORIC ARCHEOLOGY.

Man's first appearance upon the earth, or rather the time of his first appearance has, in the light of modern science, become a most interesting subject of inquiry. It seems already established that this event took place much further back than has been usually believed. Such an announcement as this would have been much more startling a few years since than it is now, when it has come to be acknowledged that the Mosaic account of the creation of the world conflicts with science only so far as it is imperfectly understood. The six days, in which all things were created, has been shown to mean six distinct periods in which the great work was accomplished, the appearance of man being the last and crowning act.

The orthodox world is no longer alarmed at the relative attitudes of science and theology. It has come to see that time is no element in the working of the allwise Creator, and that by whatever process creation was accomplished, the same power must be acknowledged. To draw an argument from a celebrated biblical author. Everything that exists either always existed, or it had a beginning. Grant a beginning, and you admit a cause. An examination of the works themselves gives the evidence of intelligent design. Therefore, the cause is an intelligent one. By the same method, all the attributes of deity may be discovered, so that without the Bible, God is revealed in His works.

Should man, therefore, be found to have existed for six millions of years, instead of six thousand, the fact proves nothing adverse to revealed or natural religion. It strengthens them rather. For certainly the methods which science reveals are more in accordance with the nature of an infinite and allwise being than the interpretations which have been given to the Mosaic record. That record states the fact, and the order in which creation took place, and science fully sustains the record. The precise length of the periods, which have been rendered "days," has nothing to do with the matter. Creation is still going on around us every day, every moment. A grain of wheat is no less created now, than at the beginning, and the same power that created it then creates it now. But creation is now a gradual process, and the multiplication of species, was undoubtedly a long and gradual work, but a *work* nevertheless.

The science of philology has been one of the instruments by which the prehistoric existence of man has been determined, but we can not in this article attempt anything further than a mere recognition of its aid in solving the problem. The theories of Agassiz, and others, regarding distinct geographical centers of origin has also had much weight in forming opinions upon this subject, but the proof of the existence of man at very remote periods, is based upon more solid grounds than either of those we have mentioned. Not only the implements and utensils of man, but human bones have been found, in positions, and under circumstances which give undoubted evidence of very great antiquity. The veteran geologist, Lyell, has fixed the antiquity of some of these remains at two hundred thousand years, which is considered by many as too small.

In view of these facts, the examination and study of human remains, everywhere, are becoming of the greatest interest, and prehistoric archeology is assuming the proportions of a science. It has its facts, and the conclusions based upon them are rapidly being systematized. The "whence and whither," of mankind are the most interesting subjects which the mind of man can contemplate, and although the latter is the one of most vital importance, there is a peculiar mystery about the origin of man which must ever render it peculiarly fascinating to scientific men.

ALCOHOL---ITS NATURE, USES, AND EFFECTS.

While we never intend to use the columns of the SCIENTIFIC AMERICAN as a vehicle for the promulgation of the ideas of extremists, either in science, mechanics, or morals, nor to assume the rôle of teacher of morality, or social science, yet the domain of the moral reformer so often trenches upon or overlaps the province of natural science and the arts, that it would be strange indeed, if we did not recognize the fact. No product of natural or artificial chemistry—if such a term may be allowed—has ever had so widespread and searching an influence on the social habits and personal morality of men as alcohol. The nature and the use of this agent then is worthy attention, even if viewed simply in a scientific light. Such a view comes properly within our domain, as the editors of a scientific and mechanical journal.

Common alcohol is designated by the formula, $C_4 H_6 O_2$—Carbon, 4; Hydrogen, 6; Oxygen, 2. It is called by some writers the "spirituous or intoxicating element in all intoxicating liquors;" by others, "rectified spirit." Wine drinking peoples seem to agree in the name by which it is designated. The French call it *Esprit de vin;* the Germans, *Rectificirter Weingeist;* the Italians, *Acquavite rettificata;* the Spaniards, *Espiritu rectificado de vino*—spirit of wine, or rectified or purified spirit of wine.

But whatever may be learned of its composition, we judge of its qualities more by its effects when used. It is a natural result of one kind of decomposition called fermentation; and this fermentation, and the consequent production of alcohol is not confined to the action of the still, nor to influences outside the human organism. As an instance in support of the latter statement, we may mention that we have repeatedly seen an old Micmac Indian get "gloriously" drunk on sweet ened water, a solution of common brown sugar in water. In this case the fermentation could not have taken place in mixing and dissolving in the tumbler, but in the Indian's stomach.

Ginger pop, root beer, ale, all fermented liquids, and vinegar (unless formed by the distillation of pyroligneous acid), contain more or less alcohol; and these so-called harmless beverages depend as much for their exhilirating quality upon the alcohol they contain as on the carbonic acid gas in their composition. It may be possible, for one whose stomach is unused to stimulants, to feel sensibly, after drinking these beverages, the same effects, although in a less degree, that the habitual drinker seeks in the rum or whisky bottle. But it is hardly to be credited that the stomach would contain enough of these liquids to produce real intoxication.

We judge of the nature of alcohol by its effects on animate and inanimate bodies. Take the latter, first. Alcohol is one of the best, if not the very best antiseptic known. Matter, which could be by no other means so well preserved from decay, change of form, or alteration of structure, is held *in statu quo* by alcohol. Extracts of the qualities of herbs, minerals, and animal substances, useful in medicine and the arts, can be preserved in their purity and power by no other agent so well. Beside its antiseptic qualities, alcohol is a stimulant, aiding in the effect of the drugs or extracts with which is combined. It stimulates the physical forces of the human system, when rendered inactive by disease; it is a "force-put," a "make-shift," as mechanics would say; useful to keep the enfeebled body from the grave, and to impart new life to organs almost past sensation by other means.

And there its usefulness ends. It never imparted additional strength to the robust; it never made the old young; it gives nothing; it only acts on what there *is*. When pure, it is a deadly poison, antagonistic to life. Its effect on the lining of the stomach, intestines, and other internal organs—the mucous membrane—can be produced even upon the epidermis or external skin, to such an extent as to blister. Alcohol does not assimilate—has no affiliation with the secretions of the human organism. It passes out of the stomach in pre cisely the same condition in which it entered it. It shows itself in the breath of the habitual drinker, in his perspiration, his evacuations. It is still alcohol. Part may be retained in the blood, which it thins and weakens. For a time it is held in the brain, stimutating it to unnatural activity; but it leaves the organ as it was before, or rather enfeebled by the task it performed while under the subtle influence of the wine spirit.

But we shall not be betrayed into a homily against the use of alcoholic stimulants. We desire only to present the facts, and leave each to judge for himself. We are aware that eminent physiologists, and others, have written labored defences of alcohol; but those who have experienced its effects upon themselves—on their physical system—leaving out its influence on their mental powers, are well fitted to judge of the value of the statements, arguments, and facts, produced by these defenders of the habitual use of a rank poison. Plain, palpable facts, are stronger than philosophical disquisitions; but, *chacon a son gout.*

THE NORTH POLE AND ITS SEEKERS.

North of Spitzbergen the Atlantic Ocean is exceedingly deep. Soundings have been attempted, and, although a mile or more of line has been used, the bottom has not been reached. The warmer currents, of which the Gulf Stream is the most notable, flowing from the Equator toward the pole, of course keep the surface, while the cold currents flow near the bottom. This well known fact has led to the belief that there must be, somewhere, a limited region where the warmer currents, meeting, would form a sort of eddy, and constitute an open polar sea. The observations of explorers have given strength to this belief. An exchange, in discussing this part of the subject, remarks that "the great Gulf Stream which is continually pouring an enormous volume of water—far warmer than the ocean through which it flows—into the Arctic Seas, must largely affect the condition of the North Polar regions. Where this stream finds an outlet, and by what course its waters find their way round Greenland into the Baffin's Bay current, are yet moot points among seamen. But whatever opinion we may form on these questions, there can be no doubt that an enormous quantity of heat is liberated somewhere in the neighborhood of the North Pole through the agency of the Gulf Stream; and it is far from being impossible that, during summer, at any rate, the circumpolar ice fields are wholly melted away."

"It is a singular fact, that in whatever direction the North Pole has been approached, traces should always have been noticed of a comparatively warm circumpolar sea or Polhynia. Baron Wrangel started northward from the coast of Siberia, over the vast fixed ice fields which cover the Arctic Sea there. He supposed that these extended far toward the North Pole, but before long he found open water, and was compelled to

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abandon his attempt to reach the Pole in that direction. When De Haven went in command of the American expedition in search of Sir John Franklin, he was told in his letter of instructions that when he had gone far up into Wellington Channel he was to look for an open sea to the northward and westward. He did so, and saw in that direction a "water sky." A few years later Captain Penny found open water there, and sailed upon it. We have seen that Dr. Kane, in 1855, saw open water from the northern extremity of Kennedy Channel, and our readers will scarcely need to be reminded of the evidence which Dr. Hayes' recent voyage affords of an Arctic Ocean extending far to the north of Greenland. In the year 1818, again, Barrington and Beaufoy called the attention of scientific men to the evidence of Dutch captains, who asserted that they had approached within two or three degrees of the Pole, that they had there found an open sea, which was heaved by a swell that showed it to be of wide extent."

Dr. Kane, also, infers the former existence of open water further south than its has been discovered, from the traditions of the Esquimaux. Such traditions rarely are found to be without good foundation.

Admitting the existence of a permanent, open sea around the pole, the question, "can it be reached by vessels?" is natural in view of the efforts now being made to accomplish that object. So far, every attempt to penetrate to it has been prevented (unless it were actually reached by Penny) by an impenetrable wall of ice. Navigators have sought in vain for leads through which their vessels might be forced, and many have been forced to abondon them in the ice-locked channels which have closed only too surely behind them. Is there a permanent and fixed break somewhere in this ice-wall, a gate ever so narrow, ever so perilous by which access can be obtained to the mysterious Polar Sea? As yet practically undecided the question finds some who believe yes, and others who believe no. Both parties find arguments to sustain their position. It is argued that the tides which rise and fall in the open Polar Sea, could not occur unless there were some large inlet communicating with the main ocean. To this it is answered that the sea is sufficiently large to admit of an independent tidal wave. Maury, while admitting that the ice wall would be a complete obstacle to the tidal wave in the Atlantic, takes this ground. He says: "I apprehend that the tidal wave from the Atlantic could no more pass under the icy barrier to be propagated in the seas beyond than the vibrations of a musical string can pass a fret on which the muscian has placed his finger. These tides must have been born in that cold sea, having their cradle about the North Pole."

Others hold that the tidal wave of the Atlantic finds its way into the Arctic Ocean round the northeastern shores of Greenland, although barred off on the side of Kennedy Channel. An adverse opinion is based upon the appearance presented by the planet Mars, whose atmosphere resembles greatly that of the earth. The white spots at the poles of Mars never entirely vanish, although, in the summer, which that planet has, as well as the earth, they become less conspicuous It is argued from this that the open sea at the North Pole is not permanent in form or position. It is also argued with much force that the statements of different navigators confirm this view; as where one has found open water others have failed to find it at the same season, and *vice versa*. The question must yet remain open, as there are approaches to the pole which have never yet been thoroughly explored. A definite answer will, no doubt, be given by the combined observations and discoveries of the different expeditions already far on their way to the north.

The German expedition, when last spoken, was in 80½° north latitude, having failed to reach the eastern shores of Greenland in latitude 75°. At that time it was still sailing northward. The Swedish expedition, when last heard from, was in latitude 80°. The route which these expeditions have taken, although on many accounts very promising, has nevertheless been fruitful of failure to other navigators. In 1607 Hudson reached 81½°. Cabot had previously reached a high latitude in the same waters. In 1827 Parry made the attempt to reach the North Pole by sailing as far north from Spitzbergen as possible, and then resorting to boats and sledges. A reward had been offered the party, if they should succeed in reaching eighty-five degrees, but they only reached a point 120 miles distant from that latitude. Here they were carried back by the ice as fast as they could advance upon its surface, the entire ice field being found to be floating steadily toward the south.

Whether the present expeditions are to be more successful remains to be shown. Meanwhile we shall be obliged to remain in suspense, as probably the last news of them has reached us until their return, if that event ever takes place.

AMERICAN SILK MANUFACTURE.

The entire value of raw silk produced in the world amounts annually, in round numbers, to two hundred and fifteen millions of dollars. The value of silk goods manufactured in France, amounts annually to nearly one hundred and fifty millions dollars. The United States have been and are still the best customer for French silk goods. Possessing mechanical skill equal to any nation on earth, and unequaled manufacturing facilities, we have yet allowed our gold to flow out in a constant current, to purchase French goods. For this there have been two reasons. First, the difference in the current rates of labor existing in Europe and America; and second, the hitherto inferior quality of goods produced in this country. The first of these reasons might have been remedied by a proper tariff upon imported silks; but so long as the second remained, there would have been nearly the same demand for manufactured silks from abroad, as the inferior article produced in this country would not have found favor with consumers of such goods. A good article of silk goods will always be preferred, without regard to its price.

Both these obstacles to the progress of silk manufacture in America are now removed. The present tariff on foreign silks enables our manufacturers to compete with European labor, while the quality of goods now produced here is in many instances equal if not superior to the imported. In order to bring the manufacture of silk to its present state of perfection in the United States many difficulties had to be surmounted, some of which we shall notice at length.

The peculiarities attending the manufacture of textures from any particular fiber, depend upon the nature of the fiber itself. The machinery used must be adapted to these peculiarities. Cotton is worked dry, the fibers admitting of being drawn in any direction; that is, two fibers of cotton laid side by side will slide one upon another either way. Two fibers of wool laid thus would be found to slide only in one direction, the wool fiber being barbed or serrated. Wool, therefore, can not be drawn out like cotton, and it requires to be oiled in order to reduce the tendency of the fibers to cling to each other in the process of carding. Flax needs to be wetted before it can be spun, in order that the fibers may be evenly drawn out, and distributed so as to make a uniform thread Silk fiber differs very materially from any other used in textile fabrics.

Silk is a hardened thread of gum, secreted by larvae of different species of the Phalaena genus of insects. The thread is composed of two filaments, which are spun simultaneously and cemented together. When wound into the cocoon, the coils mutually cohere to each other, but readily separate upon being immersed in warm water, so that the entire thread can be reeled off. As many of these filaments as may be desired to give a thread of any required size are reeled off together, and become cemented so as to form one thread. In this state it is the "*raw silk*" of commerce. When this thread is twisted, to add to its strength and firmness it is technically called "*singles*." Two or more *singles* twisted together form *tram* silk, which is generally used for the *shoot* or weft in weaving. When two singles are twisted together in an opposite direction to that in which the singles are twisted, *thrown silk* or *organzine* is the name given to it, and the process is called throwing. The lengths of filaments vary from 300 to 600 yards in a single cocoon. When the filaments are to be joined no knot is necessary, the natural gum on the silk being sufficient to effect the junction. The raw silk used in America is chiefly imported. It comes in the form of packages, each containing more or less silk as well as different qualities according to the quarter from which it is obtained. The several operations through which this silk passes in forming the different textures, are winding, cleaning, spinning, doubling, throwing reeling, dyeing, and weaving or braiding. In each of these operations, special regard is necessary to the peculiar nature of the material, its elasticity being a prominent feature.

On a recent visit to the establishment of the Dale Manufacturing Company, in Patterson, N. J., we witnessed the entire process of silk manufacture, and as the success realized by these and other works settles all doubts as to the entire practicability of the silk manufacture in this country, we believe that we can not furnish more valuable matter of information to our readers than a description of them

The ground plan of the mill is in the form of a T, the main portion having an extension from its center 50 feet in width, running 100 feet back from the rear. The main part of the building is 275 feet in length, 50 feet in width, and four stories high The building was designed by and built under the supervision of Thos N. Dale, Esq., President of the company, the entire labor being performed by day's work. The walls are twenty inches in thickness, and the building is as substantial a specimen of architecture as any structure we have seen designed for manufacturing purposes.

A portion of the lower floor is occupied by a spacious office, which opens into a large storeroom. In this storeroom is an enormous fire-proof safe for storing the raw material, etc., capable of containing millions of dollars worth of goods. From the lower floor of the extension above referred to, project two minor extensions, one each side. The first of these contains the dye works of the establishment, and the second the engine and boiler. These are so situated that in case any explosion should ever take place, the main building would not be jeopardized. The engine is of the well known Corliss make, and is of eighty horse-power. The entire building is heated by steam, and ample provision is made for the extinction of fire which, however, is less likely to occur than in cotton manufactories. The portion of the first floor not occupied by the office and storeroom is devoted to winding and cleaning. The raw silk is here placed upon reels, and from thence wound on to spools. The reels are six sided, and are technically called swifts. They are adjustable to suit the sizes of the hanks, and balanced so that they will not break the threads by irregular motion. By means of weights enough friction is produced upon their axes to keep the threads stretched. The bobbins have each an independent motion, and any one can be taken off and replaced without interfering with the others. An eye through which the thread passes to the bobbin has a traverse motion, by which the thread is wound obliquely, and lateral adhesion is prevented. Constant care, watchfulness, and intelligence are necessary in this as well as in all the subsequent operations.

Cleaning is performed by fixing the bobbins horizontally on plain spindles, and passing the thread between two adjustable pieces of metal. Should a knot or other unevenness chance to be on the thread, these pieces of metal prevent it from passing through, the plate of metal is depressed and the bobbin is lifted off the friction roller which gives it motion, The stoppage being perceived by the attendant, the defect is removed and the work proceeds. The silk being cleaned, it is next spun. The second floor is devoted to this operation. The spinning is, however, only the twisting of the threads, the real spinning having been done in the outset by the silk-worm. The twisting is effected by passing the threads required from the boobins upon which they are wound, to other bobbins placed on spindles provided with flyers, through the eyes of which the threads pass. The amount of twist is regulated by the velocity of the second series of bobbins, which have the usual traverse motion.

When the threads are twisted they are next doubled, that is, several of them are wound together upon the same bobbin. They are next twisted together upon frames precisely like those used for spinning. This process is called throwing or spinning, and the silk after it is thus twisted is called *thrown silk*. The doubling frame is provided with independent stop motions, one for each thread, so that when any one breaks the bobbin upon which it is being wound stops, until the thread is mended by the attendant and set in motion again.

The silk is now ready for the dyer. It may be dyed in a *hard* or *soft* state, that is, with the gum on, or removed by long boiling with soap and water. The proper estimation of the amount of gum removed is most important, as throughout the whole process of manufacture weight is the basis of value, and the check upon employés. The amount of loss in cleaning is usually 25 per cent. The most admirable system prevails in the works of this company, involving the most strict methods of book-keeping in every department. Each room, when it receives stock in any stage of advancement, credits the department from which it is received, and has the same charged to its account. The goods, when delivered into other hands, must with the waste correspond in weight to what was originally received, minus a small percentage which, adhering to the floors and walls of the room, can not be recovered. The result of all this is two-fold. First, it enables the company to transact its business intelligently, thus avoiding the too common fault of manufacturers—namely, ignorance of important defects until too late to remedy them. Second, the system of tests and checks running through the entire routine of this establishment is such that any fault can be at once detected and traced to its proper source, and the blame thrown upon the person who has committed it. Orders are transmitted in writing to and filed as vouchers by the foreman of each department. An incident illustrative of the benefits of such systemization recently occurred. Some goods were found to be deficient in weight when single pieces were tested, although the aggregate weight was correct. An examination immediately took place, but the cause for a considerable time eluded pursuit. Experiments were instituted, and the error was found to have arisen in the following manner. Some reels having been constructed of the proper size, the edges of the bars had been left somewhat rough. The operative in charge, wishing to correct the fault, sandpapered them, thus slightly reducing the size. This was the sole cause of all the mischief. The reels were afterward protected by plates of polished brass, and the operative cautioned against taking any such liberties in the future. The importance of such a system in the manufacture of a substance so valuable as silk, is obvious.

Dyeing is the next step. Our space will not admit of a full description of this process It is the most critical of all, and although the Americans have been for some time able to compete with the French in all colors save black, the difficulties attending the production of the latter have been only overcome within the last two years. Now, as fine blacks are made here as can be found in any market. A piece of American black dress silk was shown to an expert in our presence, who avowed that it was fully equal in all respects to the French silk, and could be sold as such in France. An error generally prevails among buyers in regard to sewing silk. The basis of price in this as well as all other silk goods is weight. Silk loses a certain amount in cleansing, as we have shown, but in dyeing it may be increased in weight so as to more than cover the loss. Heavy silks can thus be sold cheaper than light ones, but the gain in weight is at the expense of length of the thread. while the added weight in dyeing does not increase its strength. The high priced sewing silks are, therefore, the cheapest, as greater length of thread of a given strength is obtained for the money than in the cheap silks.

The third floor of this mill is still vacant. It has been reserved as a weaving room for dress-goods; and it is hoped that a company may soon be organized to occupy this room in the manufacture of such fabrics, now that the interests of importers and manufacturers are rendered mutual by the increased cost of imported goods. Formerly, these interests were antagonistic. The result was an effort on the part of home manufacturers to make an article which could compete in price. The effort now is to compete in quality. A comparison of goods shows that the latter attempt has been successful; and domestic silks are now afforded at a less price than the French of equal grade.

The Dale Manufacturing Company confine themselves, as yet, to the production of cords, braids, bindings, sewing silks, etc.; but there are large inducements to commence upon broad goods, which they have already successfully produced in small quantities.

The fourth floor is occupied by looms and braiding machines The looms are of quite a primitive construction some having the Jaquard attachment, but all appearing large and cumbersome for the light and delicate textures formed upon them. We greatly mistake if Yankee ingenuity does not ere long replace these machines with lighter and more effective devices We learn that two important improvements are

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already in progress. The braiding machines are peculiar in appearance and operation. The principle upon which they operate may be illustrated by the "*ladies' chain*" in a quadrille. A number of bobbins are fixed upon a horizontal circular platform. They are placed upon spindles, and by an ingenious mechanism are made to dance around each other and around the platform, at the same time whirling on their axes like nothing that we can conceive of but the figure in the quadrille alluded to. The threads are thus interwoven into beautiful and intricate textures.

In closing this article we wish to make some remarks upon what seem to us causes of failure in some attempts to manufacture silk in this country. We have already mentioned the difference in price of labor in Europe and America, and it will be seen that when labor is worth in France only one fifth as much as in the United States, and in England only one fourth as much, that without protection the Americans could not compete with them. The present tariff on pure manufactured silks is sixty per cent *ad valorem*; on mixed silks fifty per cent; on organzine thirty-five per cent, and on raw silk nothing. The conclusions from these facts are obvious; but there is another effect of protection that will not be so generally perceived. France and England manufacture for a foreign market; the United States manufacture for themselves. The French workman is forced to be content with his blouse and wooden *sabots*, the Englishman with his corduroys. This state of things is necessary that labor may be cheap. The system abroad depresses labor, our system elevates it. Here the producers are consumers also, and enjoy in large measure the comforts of the more affluent, including educational facilities which render them able to prepare their children for higher stations in life as such open to them. This is proved by the fact that in the city of New York at this time large numbers of wealthy and prominent men are the sons of hard-working and industrious mechanics, who have, by virtue of their talents and business energy, risen from the ranks, to honor and preferment.

A fruitful cause of failure has been in injudicious location. No one who has examined the subject can have failed to perceive that peculiar manufactures tend to centralization, and in all industries requiring such intelligence as is necessary to conduct the manufacture of silk, this is the natural law. Those who ignore it must eventually suffer from its violation. We might adduce instance upon instance to illustrate this point but it will not be necessary. The names of Lyons in France, Birmingham and Sheffield in England, will suggest many others to the minds of our readers. The attempt to distribute this growing branch of industry rather than to concentrate it around the nuclei already established, must in our opinion prove disastrous. Add to the protection offered by the Government, the mechanical genius of the American mind, and a recognition of the laws of industry, and the permanent establishment of the silk manufacture in this country will be placed beyond question.

LITERATURE FOR WORKINGMEN.

A Baltimore journal, devoted largely to a very light species of literature, puts forth a plea for the more extensive circulation of that class of reading among the working classes This is quite natural. Interest is too often an obstacle to correct opinion. We were not, however, prepared to see such literature put at the head of all others, as being the precise thing that the masses need to supply their mental and moral necessities, as is done in the following quotation:

"The putting into the hands of the workingman imaginative literature is even a more important advantage than the cheapening of scientific books. The tendency of mechanical employments is to exercise the understanding alone; they afford no diet for the fancy or the feelings. They leave unfed no small portion of the intellect. They do not enlarge the world of observation or experience. They do not open any of the doors of history or biography. The artisan, like the student, requires the hours of leisure to stand in contrast with his daily employment. A few will find recreation even in severer studies, and will resort to it by a natural instinct; but we speak of the many who are used to be led rather than the few who can guide themselves. And, for the many, narrative, sometimes historical, but more frequently imaginative, holds out greater attractions than all the publications of the Useful Knowledge Society, or than all the excellent manuals of more recent date of mathematics, chemistry, or natural history."

The paper from which this is taken is a large and popular journal, and it is doing a great injury to the public by such false instruction.

It is a tissue of unfounded, and as such, uncalled for assertion from beginning to end. The tendency of mechanical employments is not alone to the exercise of the understanding. Granted that there are many occupations that require little of understanding or fancy, or anything else but elbow-grease (sawing wood for instance, which is a mechanical employment), we assert that there are no employments except the fine arts and authorship in which fancy has greater scope, and none whatever that call into more active play all the mental faculties than mechanical occupations. They do not leave the intellect unfed any more than other work, and if they did, we fail to see why imaginative literature is the proper food for famished minds.

Let us go down to the very root of this matter. All the useful arts are devoted to the supply of the wants of man The first of these is air; that nature supplies. The second is food. Agriculture is then the first and most essential of all occupations, and as such it employs the largest number of individuals. Is there no scope for fancy and feeling here? Is all appreciation of the beauty of fruits and flowers, and billowy meadows, and ripening grain, confined to poets, painters, and novelists? What say you, country lads and lasses?

After food, clothing. Is there no room for play of fancy here? From whence have originated the beautiful textures, the designs for jewelry, the general taste which pervades the civilized world for refinements of dress?

But perhaps we shall find the field narrowed when we come to dwellings? No. Architecture attained, long ago, the dignity of a fine art.

How is it about those who make the machines, the implements by the use of which mankind are fed, and clothed, and housed? Here we are on our own ground, and we know of what we speak. First, the motors. A steam engine, or a turbine wheel. Did ever Raphael paint, or Grecian sculptor carve a form of greater beauty than a first class steam engine? Talk of the poetry of motion. The motion of the steam engine, and its influence upon the progress of civilization, is a grander epic than ever yet was written. We grant you that a turbine wheel has more mathematics in its compact framework than artistic taste, yet even in this triumph of hydraulic science, we may find curves upon which the eye can pleasurably linger. Pass from the motors to the lathes, the planes, the spinning jennies, the looms, the steam fire-engines; the carriages, railway cars, steamboats, and all the other paraphernalia of civilized life, and then say if you will that fancy is excluded from the mechanic arts. Every artizan is insulted by such a statement, and still further insulted by the statement that his mind can digest only the light and trashy imaginative literature which forms the staple of the paper that thus puffs its wares.

We do not believe in the entire exclusion of all the lighter kinds of literature; but we denounce such willingness to pander to a depraved taste as is manifested in the quotation we have cited. The silly love stories or the wonder-exciting tales of bloodshed, and crime, and narrow escape, with a spice of ghost stories thrown in for a relish, which abounds in many publications,—the most vapid, most diluted broth of literature is something we protest against as mental pabulum for any class of people whatever, especially for those young and intelligent mechanics and apprentices who weekly read the SCIENTIFIC AMERICAN.

WEATHER PROPHESYING.

That science will yet ascertain a way of foretelling storms, we firmly believe. Indeed, the telegraph is even now usefully employed for this purpose, and its agency, we hope, will at some not distant date serve to warn our coast dwellers and coastwise crafts of an approaching storm in time to enable the one to prepare to assist the other. Since the publication of Prof. Espy's Theory of Storms, much attention has been devoted to this subject, and although a system which is entirely reliable and generally applicable, has not yet been perfected, it is to be hoped that the progress of scientific investigation will yet evolve such a system.

The weather prophesying, however, of experts, who calculate by the phases of the moon, by the comparison of one season with another, by cycles of storms, by the variations of the barometer, and the fluctuations of the thermometer, we deem of no value whatever Nothing has ever yet been adduced to prove that the moon has any appreciable influence over the climate of this planet, or the temporary changes in the climate of localities The comparison of former years with the present afford no criterion. The changes on the surface of the inhabited earth, by the destruction of forests and the multiplication of civilized habitations have much to do with alterations of climate. The theories of storm cycles are yet in embryo. Sudden fluctuations from causes beyond our knowledge are not taken into account by storm theorists; or if so, these fluctuations upset all their calculations, and they are left in the dark. The variations, neither of the barometer or the thermometer, are to be confided in. They are unreliable.

The astronomer, who from the top of his tower, or from a mountain summit; or the sailor, who has a more extended field of vision, may, from the appearance of the clouds and the condition of the atmosphere, prognosticate the advent of a storm and its direction. So, also, the farmer and the hunter, by long experience, necessitated by their pursuits, learn to read the heavens, or, rather, the atmosphere, to some benefit; but when our weather prophets presume to foretell a dry summer, a lean harvest, a cold winter, from their yearly observations, based only on observation, and not on a thorough knowledge of natural laws, we choose to place but little reliance on their prognostications.

Hardening the Moldboard of Plows.

A new method has been discovered for the manufacture of the moldboard of plows, which gives them all the hardness and temper of steel, in combination with the toughness of iron. The moldboard (good iron) is heated and dipped into molten iron. It remains there ten seconds, when the two surfaces become heated to a white heat, while the center is not heated through. It is then immediately dipped into water; the surfaces come out harder than the highest tempered steel, while the interior is still iron and retains all the toughness and strength of the iron. The advantages claimed for this invention is that the plows made by this process will take the finest and hardest polish, while they will be tough enough to endure any reasonable knocking about in stony soils.

We find the above in one of our exchanges. What is the new method? and where are such plows manufactured? We have had several inquiries about this matter.

A MAN in England recently made fifteen miles in one hour on a velocipede.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING OCTOBER 13, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

82 913.—EEL POT.—George D. Allen, New York city.

I claim the eel pot funnel, of india rubber, and perforated substantially as above set forth.

Also, the eel pot funnel, formed of india rubber, with a contracted mouth, substantially as before set forth.

Also, the combination of the eel pot funnel, with needles pointing toward its neck, substantially as before set forth.

Also, the eel pot funnel, having the two characteristics of perforation and a contracted mouth substantially as before set forth.

Also, the combination of the body of the trap with a funnel of india rubber, substantially as before set forth.

8 ,914.—ALKALI CAN.—Christian Barry, Philadelphia, Pa.

I claim an alkali can, in which clay is used for producing a tight joint, substantially in the manner described.

82,915.—CORN HUSKING PIN.—Elias Blair, Bucyrus, Ohio.

I claim an instrument for husking corn, constructed substantially in the manner shown and described.

82 916.—PEN RACK.—Charles J. Bouche, Louisville, Ky.

I claim a pen rack, composed of the sides, A B C D, connected by hinge joints, as shown, the hinged roof, H I, brace, F, and racks, M, all constructed and arranged substantially as described, and provided with calendars, O P Q, and lips, S, for the reception of cards, substantially as set forth.

82,917.—CENTERING SQUARE.—George W. Brooks, Clinton, Mass.

I claim, in combination with the square, the adjustable slotted bar, b, when constructed as and for the purpose substantially as described.

82,918.—CORN PLANTER.—John A. Burchard, Beloit, Wis.

I claim, 1st, Broadly, the employment of the dropping device, D, when constructed and arranged substantially as herein described and for h, and used for the purpose of enabling the operator to know by ocular demonstration whether the machine is dropping the seed with certainty and accuracy.

2d, In combination with the device, D, the pawl, K, and stop latches, g and l, when used for the purpose herein set forth.

3d, The combination and arrangement of the several parts of the planter herein described, when used for the purpose set forth.

82 919.—HOLLOW WINDOW CROSS BAR OF SHEET IRON.—T A. Cambensy, Chicago, Ill.

I claim, as a new article of manufacture, the hollow sheet metal window bars, constructed substantially as shown and described.

82 920.—BLIND HINGE.—Charles B Clark, Buffalo, N. Y.

I claim forming the cylindrical pintle, a, with the depressed slot, b, and the circular eye c, with outside catch, d, the whole combined and arranged as described, and operating in the manner and for the purpose specified.

82,921 —METALLIC COUNTER BRACE.—John L. Cooper, Preston, Conn., assignor to himself and Joshua E. Fellows.

I claim the new article of manufacture of a spur socket, in combination with a counter brace, when made and applied substantially as herein described.

82 922.—OX YOKE.—William Cooper. Paris, Me.

I claim the sliding slotted plate, a, held by staples, b b', and adjusting nuts, c c', and carrying the shaft ring, f, as and for the purpose set forth.

82,923 —HARROW. —Andrew J. Craig, Ashmore Station, Ill.

I claim the bent teeth, A A, pivoted together as described, so as to form a harrow with flexible sides, substantially as and for the purposes herein set forth.

82,924 — WASHING MACHINE.—C. H. Cramer, Rutland, N Y.

I claim the combination of the adjustable frame, B, and the treadle, I, for raising the same and the screws, H, for regulating its pressure, substantially in the manner and for the purpose described.

82,925. — HYDROCARBON BURNER.—Sutton Edward Crow, Stratford, England. Patented in England, June 14, 1867.

I claim the arranging the apparatus in such manner that a jet or jets of steam, under pressure, or, it may be of air, issues into the furnace in a direction parallel, or nearly parallel, to a pipe or passage by which combustible liquid is led into the furnace, such jet being immediately in rear and below the mouth of such pipe or passage, substantially as described.

82,926 — MORTISING MACHINE. — Franklin A. Deland, and Luke Phillips, Memphis, Mich.

We claim, 1 t, The combination of the vertical guide, C', bed, C, slotted lever, D', and pin, E', substantially as and for the purposes herein set forth.

2 t, The independent perforated guide plate, C, in combination with the jaw guide, N, and vertical bar, E, when constructed, arranged, and operating, substantially as and for the purpose herein set forth.

82,927. — ATTACHING ROSETTES TO HARNESS. — William L. Denio (assignor to himself and Irwin Davis), Rochester, N. Y.

I claim the rosette, A, provided with the screw socket or nut, b, in combination with the screw loop, B, and attaching straps, g h, the whole arranged as described, and operating in the manner and for the purpose specified.

82,928 —PIANOFORTE BRIDGE.—Charles H. De Vine, Buffalo, N. Y., assignor to De Vine Brothers.

I claim the curved bridge, A, composed of veneers, a a a, and b, having the ivory or equivalent top plate, F, attached, as herein described.

82,929. APPARATUS FOR SETTING AXLES TO WAGONS.—David Ducharne, Mechanicsville, N. Y.

I claim 1st, The hook or jack, B C, and the upright fulcra or studs, E and E', in combination with the horizontal cross bar, F, each being constructed and operated substantially in the manner and for the purposes herein described and set forth.

2 t, The triangular shaped guide, H, in combination with the jack, B, studs, E and E', and cross bar, F, substantially in the manner and for the purposes herein described and set forth.

82,930. MOUNTING SPECTACLE AND EYE-GLASSES.—Charles N. Dunham, Philadelphia, Pa

I claim the glasses, A A, having the pieces, B B, D D, cemented to them, as a new article of manufacture.

82,931. — CORE BAR FOR CASTING PIPES.— John Enright (assignor to himself, William Wall, and Thomas Enright), Louisville Ky.

I claim the collapsable metallic core rod or cylinder, having four longitudinal segments, A, so constructed and arranged as to be operated independently of each other, as herein shown and described.

82,932.—STUMP EXTRACTOR —R. B. Ferris, Holland, Mich.

We claim the combination of the lever, H, sheave, F, chain, I, rope, J, sheave blocks, 3 and 4, sills, A, post, B, tie beams, C, standards, D, pulley, E, and halyard, K, when constructed, arranged, and operating substantially as described and for the purposes set forth.

82 933.—ADJUSTABLE SQUARE AND BEVEL.—E. B. Foster and John G. Witt, Elmira, N Y.

I claim the combination with a try or T-square, of the wings, D D, and the screw, F, for adjusting the angle of the same, substantially as described.

82,934.—PLOW.—Andrew Friberg, Moline. Ill.

I claim the plate, C, constructed and applied between the landside, A, and the handle, B, of a plow, substantially as described.

82,935.—RATCHET-AND-PAWL MECHANISM.—Joel Garfield, Groton, Mass.

I claim in combination with a ratchet wheel and pawl arranged substantially as shown and described, the loose collar or disk, b, having an inclined slot, into which the pawl pin projects, rotation of the pawl plate in one direction forcing the pawl up into engagement with the ratchet teeth, and its rotation in the opposite direction carrying it out of engagement therewith, substantially as set forth

Also, in combination with the ratchet wheel and pawl and the loose collar, the stud, b, and adjustable screw or pin, n, operating substantially as shown and described.

82,936.—STEAM ENGINE PISTON VALVE.—Richard Gornall, Baltimore, Md.

I claim, 1st, The combination of the main valve, C, with the interior sliding valve, D, having the flanges, e e, substantially as and for the purposes specified.

2d. In combination with the valve, C, and the interior sliding valve, D, the auxiliary steam ports, n n', substantially as and for the purpose specified.

82'937.—RAILWAY FROG.—Josiah Gray, Chicago, Ill.

I claim, 1st, The shield, H, constructed substantially as described, in combination with the point, C, and guard bars, B, as and for the purposes set forth.

2d The combination of the chairs, E, bars, F, guard bars, B, shield, H, and point, C, all operating substantially as set forth and shown.

82,938.—CULTIVATOR PLOW.—B. F. Guy and J. V. Guy, Macomb, Mich.

We claim, 1st, In combination with plows thus hung in a frame, the spring bars and connecting chains or cords, as and for the purpose set forth.

2d, In combination with the plows, their bifurcated rods, and spring bars, the shoes, e e, substantially as and for the purpose set forth.

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3d, In combination with spring bars, and plows of described cultivator, the rack, i, with its handle, i', as and for the purpose described.

4th, The cultivator plow when constructed of the several parts, all arranged to operate substantially as and for the purposes set forth.

82,939.—BUTTER TUB.—Earl Guyer, Wolcott, Vt.

I claim the combination of the butter tub, A, cover, B, keys, C C, cross bar D, and bent metal bars, E E, or their equivalents, substantially as and for the purposes herein set forth.

82,940.—ANCHOR.—J. W. Habberley, South Malden, Mass.

I claim an anchor when constructed of the shank, A, of wrought iron, inserted into the cast hub, B, which latter is provided with sockets for the reception of the square inner ends of the flukes, D, which are secured by pins or keys, substantially as described.

82,941.—DEVICE FOR CHANGING THE SPEED OF MACHINERY.—Tho. C. Hargrave, Boston, Mass., assignor to himself, Wm. B. Charlton, and H. K. Moore.

I claim the pulleys, B C, secured to independent shafts, d L, revolving one within the other, and connected by means of gears, I K and g M, to the driving shaft of the machine, the pulley, A, and belt shipper, E, by means of which the rate of speed may be expeditiously changed, the whole combined and arranged substantially as described.

82,942.—COMBINED HARROW AND CULTIVATOR.—David M. Harkrader, Chili, Ill.

I claim, 1st, The knives or cutters, Q Q, combined with the frame pieces, B C D and E, and the shovels, P P, teeth, O O, handles, K K, cross pieces, R R, bows, S S", and hitching device, T T U, constructed and arranged as described and for the purpose set forth.

2d, The combination of the frame, A F, substantially as described, with the frame, B C D and E, constructed and arranged as described and for the purpose set forth.

82,943.—SAW HANDLE.—Wm. T. Harvey, Jr. (assignor to himself and Peter Grimes), Philadelphia, Pa.

I claim the combination of the handle, A, metallic plate, M', with lug, L, for fitting into the notch, N, plates, M M, pin, P, confined by screws, S S, for retaining a saw blade, the whole constructed to operate in the manner and for the purpose set forth and described.

82,944.—ELASTIC GORING FOR BOOTS AND SHOES.—John Haskin, Boston, Mass.

I claim as a new article of manufacture a goring for boots and shoes, made of perforated rubber sheets, with stays, B B, saturated with an elastic varnish, as and for the purposes described and specified.

82,945.—HEATING STOVE AND FIRE PLACE.—A. J. Haswell, Circleville, Ohio. Antedated Oct. 6, 1868.

I claim, 1st, The division plate, b, applied in connection with the stove, A, in the rear of the fire plate, a, to produce the passages, h and i, in the manner and for the purpose explained.

2d, The division plate, b, provided with the tubes, b' b", and the orifices, d, substantially as described.

82,946.—BOOT AND SHOE BOTTOMING.—Cyrus Hay, Stoneham, Mass.

I claim a shoe "bottoming" made substantially as described and for the purpose set forth.

82,947.—CHURN DASHER.—Martin Heliker and Orsamus A. White (assignors to themselves and J. W. Bostwick), Norwalk, Ohio.

We claim the concentric circles or coils of wire, C, as arranged in combination with the radial arms, B, for the purpose specified.

82,948.—HOT AIR FURNACE.—John I. Hess, Philadelphia, Pa. Antedated Sept. 26, 1868.

I claim, 1st, The combination and arrangement of bed plate, B P, fire chamber, F G, heating drums, H D and H D', and C D and C D', with their spirals, connecting pipes, P P1 P2 P3 P4 P5 P6 and P7, turn table composed of parts, L P and T P, water box, W B, for the purpose specified.

2d, The application of the within described turn table to stoves or other heating apparatus, for the purpose specified.

82,949.—COMPARTMENT CANE.—L. C. Heylin, Philadelphia, Pa.

I claim a cane arranged as herein described, whereby one portion thereof is adapted to be used as a pipe, the handle of which is contained in a compartment formed in the same, and other portions of the body of the cane being provided with receptacles for cigars, tobacco, and matches, the whole constructed as herein described.

82,950.—POTATO WASHER.—D. K. Hickok, Morrisville, Vt. Antedated Sept. 30, 1868.

I claim the arrangement of the arm, D, and shaft, C, with the vessel, B, when provided with a lid and feet and perforations, as described, the several parts being constructed and used as and for the purpose herein set forth.

82,951.—LAST.—Benjamin Hitchings, Lynn, Mass.

I claim attaching the block of a last to the body of the same by means of a continuous dovetailed-formed bead, C' D', said bead being curved longitudinally, forming an arc of a circle, which fits into corresponding dovetailed groove, C D, formed in the body of the last, substantially as described and for the purpose set forth.

82,952.—SKATE.—Horace B. Hooker, Rochester, N. Y. Antedated Oct. 6, 1868.

I claim, 1st, A skate having a heel plate, H, with its flange, q, and spurs, d, in combination with the bail, D, and cam, v, all acting conjointly, as and for the purposes herein set forth.

2d, The tripod heel-plate support, composed of the posts, F, as herein described.

3d, The adjustable toe plate, B, in combination with the self-adjusting clamp G, as and for the purposes shown.

82,953.—SKATE.—H. B. Hooker, Rochester, N. Y. Antedated Sept. 28, 1868.

I claim a skate having a heel plate, D, with its flange, a, and spurs, b, in combination with the adjustable clamp, G, and jam nut, C, all acting conjointly, as herein shown and for the purpose set forth.

82,954.—GIG SADDLE.—John Hughes, Newark, N. J. Antedated Oct. 3, 1868.

I claim, 1st, The seat, A, with the recesses, B and R, the piece, C, and back piece, E.

2d, The crupper loop, F, arranged with the recess, and piece of leather, I.

3d, The plate, L, with the pins, M, or their equivalents, in combination with the frame, G.

4th, The construction of the jockey, P, by incasing the extra plate, L, and fitting the upper end of the jockey to the shape of the seat, A, substantially as and for the purpose specified.

5th, The whole in combination substantially as and for the purposes specified.

82,955.—FOLDING CAMP STOOL.—James Ingram, Troy, N. Y.

I claim the arms, D D', legs, E E', hinged to the center piece, A, and the springs, F F', each and all being constructed, arranged, combined, and operated as a whole, in the manner and for the purposes substantially as herein described and set forth.

82,956.—EXPANSIVE BIT FOR WOOD BORING.—W. A. Ives, New Haven, Conn.

I claim the mode of holding in place the adjustable cutter, C, by its upper edge, by means of the groove, B, the wedging screw, a, and slot, b, in the cutter, C, and set screw, d, constructed and arranged substantially in the manner as above specified.

Also, the adjustable cutter, when constructed in such a manner as that all the wood is removed without the necessity of the ordinary fixed central cutters upon the stock, substantially as set forth.

82,957.—HOLLOW AUGER.—W. A. Ives, New Haven, Conn.

I claim the combination of the circular stock, A, slot, B, and screw, E, and two movable jaws or knife holders, C C, constructed and operated substantially for the purposes and manner as above specified.

82,958.—FLOUR DISPENSER.—Daniel L. Johnson, Yorkville, Mich.

I claim the construction and arrangement of the hopper, A, tube, B, and vertically adjustable spindle, D, having disk, F, and wing, w, attached thereto, with the casing, C, and guard, L, all combined and operated substantially in the manner and for the purposes set forth.

82,959.—PLOW.—G. W. Keeler, New Haven, Ohio.

I claim, 1st, The wings, F, when hinged to the plate, D, and standard, B, so as to allow of their being constructed or expanded in the manner as and for the purpose specified.

2d, The plate, I, as arranged in combination with the plate, D, and wings, F, for the purpose set forth.

82,960.—SPRING-BED BOTTOM.—J. B. Kelley and N. P. Kingsley, Brandon, Vt.

We claim, 1st, The combination and arrangement of the springs, c' c", blocks B B, and clamp screw, s, substantially as and for the purposes set forth.

2d, The arrangement and combination of the springs, c' c", blocks, B B, and clamp screw, s, with the spring, c, blocks, b b, and slats, a a a, substantially as and for the purposes set forth.

82,961.—HARNESS-SADDLE TREE.—Jacob F. Knoor, Orange, N. J., assignor to Frank K. Hipple, Philadelphia, Pa. Antedated Oct. 3, 1868.

I claim, 1st, A loop or bridge spanning the avenue through which the back band, crupper loop, and saddle-hook pass, substantially as described and for the purpose set forth.

2d, The affixing the burrs or nuts of the terrets to the back pad, and conveying it beneath the bridge, to receive the screw end of the terrets, substantially as described, and for the purpose set forth.

82,962.—WRENCH.—E. J. Leyburn, Lexington, Va.

I claim, 1st, The arrangement of the arms, E E, and jaws, F F, in relation to the unbroken ratchet (which ratchet is capable of being turned through a complete circle), so that said jaws are adjustable for large and small nuts, within the capacity of the wrench, without a corresponding enlargement of the ratchet wheel being necessary, substantially as described.

2d, The combination of the pivoted right-and-left pawl, a a, with the arms, E E, and adjustable jaws, F F, substantially as and for the purpose described.

3d, The jaw-holding portion, D1 E E, hub, D2, ratchet wheel, D, adjustable jaws, F F, handle, A, and pawl, C, a a, all combined and arranged substantially as described.

82,963.—AGRICULTURAL LOCOMOTIVE WITH SPADING APPARATUS.—Conrad Locher, Oroville, Cal.

I claim, 1st, The application of equalizing gears between the axles of a wagon, so, in turning a curve, each wheel adopts the speed which the curve requires, and receives its propelling motion from the engines by means of gearing, or their equivalent.

2d, The gearing and connection through the kingbolts.

3d, The spaders, so constructed that they enter the soil like a pick, (nearly vertical), cut off a slice like a spade, and turn it over like a plow.

4th, Turning the spaders in the same direction as the wagon, thereby assisting locomotion.

5th, The combination of the whole, in the way and manner herein set forth.

82,964.—APPARATUS FOR PRODUCING RECIPROCATING MOTION.—J. J. P. Lyon, Ypsilanti, Mich.

I claim the wheel, A, support, B, lever, C, connecting rods, D, and counterpoise weight, F, when used in connection with pump rods, E, and weights, G, and operating substantially as and for the purposes herein described.

82,965.—GRATE BAR.—William S. Mackintosh, Allegheny City, Pa.

I claim the grate bars having a broad upper face with sides tapering downward, when made hollow, for the passage of water through them, substantially as and for the purpose hereinbefore described.

82,966.—CAR COUPLING.—S. Madden, Eureka South, Cal.

I claim the above-described combination and arrangement of devices to form an automatic car coupling, consisting of the sliding bumper, E, with the slots, G and G', opening, J, and spring, F, the pin, I, with collars, H and H', and the guiding plate, K, with or without the rollers, D, at the end of the link, substantially as specified.

82,967.—WATER LEVEL DETECTOR FOR BOILERS.—John Maslin and David Birdsall, Jersey City, N. J.

I claim the combination with the stem or plug, D, of the cam, K, disk, L, the valve, d, of the whistle with its stem and the spring, f, as described.

82,968.—BUOYANT PROPELLER.—Elisha Matteson, Brooklyn, N. Y.

I claim the cylinder, A, air tight and provided with independent air tight V-shaped buckets, C, arranged on the exterior of said cylinder, and within a suitable frame, B, to operate substantially as set forth.

82,969.—GAGE.—Lafayette H. Mayott, Springfield, Mass.

I claim the construction and arrangement of the graduated beam, A, having a thread cut thereon, in combination with the sliding arm, B, and nut, C, engaging therewith, set screw and stationary arm, the whole constituting an adjustable side gage, substantially as described.

82,970.—SAW MILL.—Alex. McCreight, Tranquility, Ohio.

I claim, 1st, The ratchet bars, g g, ratchet wheels, h h, and bar, K, when combined with the fixed frame, b b b' b', moving frame, d d d' d', and operated substantially as described.

2d, The shaft, C, of the described mill, in combination with the shafts, H and H', with their connections of gearing upon the shaft, C, and bearings in the levers, m m', and connecting bands with roller, M, all as and for the objects described.

82,971.—MACHINE FOR CUTTING SOAP.—Peter B. McKelvey, Albany, N. Y.

I claim, 1st, The carriage, I, constructed and operated substantially as hereinbefore specified and set forth.

2d, The said carriage, when combined with stationary wires, in the manner and for the purposes above described and set forth.

3d, The combination of the stationary wires with the notched plates, B and C, the screws, G, and nut, F, substantially in the manner and for the purposes hereinbefore specified and set forth.

82,972.—HORSE RAKE.—G. M. L. McMillen, Dayton, Ohio.

I claim, 1st, The adjustable fastening for the rake teeth, consisting essentially of the lugs, D and G, and screw bolt and nut, H, the lugs being constructed with the flanges and arms as described, and the whole operating together in the manner and for the purpose set forth.

2d, The guide standards, J J, when constructed with the head, j, and the slot, i, extending about half way from the spring bar to the head, j, and when made adjustable in relation to the spring bar by means of the screw thread and nut, or any equivalent device, and operating in connection with the spring, K, and the rake teeth, substantially as described.

82,973.—BOLT HEAD.—Franklin S. Miles, Philadelphia, Pa.

I claim, as a new article of manufacture, a bolt head, constructed as above described.

82,974.—LOW WATER INDICATOR.—William Moore, Kokomo, Ind.

I claim the combination and arrangement of the chamber, A, index lever and scale, with the water regulator, all for the purposes and substantially as herein described and set forth.

82,975.—MATTRESS.—Albert G. Morey, Chicago, Ill. Antedated September 30, 1868.

I claim, 1st, A mattress or cushion composed of alternate layers of elastic sponge and some semi-elastic material, substantially in the manner and for the purpose set forth.

2d, Supporting one or more layers of elastic sponge with some less elastic substance in the construction of mattresses or cushions, substantially in the manner and for the purposes described.

82,976.—COFFEE AND TEA STEAMER.—Charles G. Murch, Chicago, Ill.

I claim, in a coffee or tea apparatus, the inner vessels, A A G, with the stop cocks and the upper vessels, B B, pipes, E, and strainer, C, the whole combined and arranged substantially as and for the purposes shown.

82,977.—RAILWAY FROG.—William H. Nobles, St. Paul, Minn. Antedated October 10, 1868.

I claim a railway frog, when constructed with the rails, B B, with their flange grooves and facings, C C, all arranged as described and for the purposes set forth.

82,978.—CAR WHEEL.—William H. Nobles, St. Paul, Minn. Antedated October 10, 1868.

I claim the construction of the wheel, A, with two flanges, B B, and three treads, C C C, as shown and described, and for the purposes set forth.

82,979.—HORSE HAY FORK.—J. K. O'Neil, Kingston, N. Y.

I claim the two levers, A B, with their beaks, a b, and spring detent, c, connected and operating in combination with the prongs, G G, of the fork, substantially as and for the purpose herein specified.

82,980.—BLIND SHUTTER FASTENING.—Oscar Paddock, Watertown, N. Y.

I claim, 1st, A device for opening or closing and fastening blind slats, composed of the herein described toothed segment, and endless screw for operating the same, the said parts being applied to the blind slats or shutter or blind frame, respectively, and combined for operation in the manner shown and described.

2d, The combination with the hollow plunger, or sliding rod and set screw, or equivalent device, upon the same, of an auxiliary adjustable rod, supported in said plunger, and provided with a follower, for engaging with the blind slat fastener, substantially as described, for the purposes shown and specified.

82,981.—VOLTAIC BATTERY.—Henry Palmer, Evanston, Ill.

I claim the combination of the plates, B, and the positive and negative elements, when arranged to operate in the manner and for the purposes specified.

82,982.—APPARATUS FOR DYEING HAIR.—William Patton, Springfield, Mass.

I claim, in combination with a comb, H, or other suitable device for applying them to the hair, beard, or moustache, simultaneously, for the purpose of coloring either, alternate coats of nitrate of silver and gallic acid, conveyed and attached to such comb, or other device, by means of suitable vehicle, such as gum-arabic, gum-tragicum, caoutchouc, substantially in the manner herein described.

The combination of the nitrate of silver with the gum-arabic, or other suitable gelatinous vehicle for the purpose, prepared and applied substantially in the manner described.

The arrangement of the comb, H, with two rows of opposite teeth, one row prepared with nitrate of silver and the other with gallic acid, in the manner described.

82,983.—MANUFACTURE OF GLASSWARE.—John P. Pears, Birmingham, Pa.

I claim a mold for making footed or footed and stemmed glassware, whereof that part in which the body, stem, and foot are formed is in a single piece, without part or division, in combination with the bottom plate having a projecting core, substantially as and for the purpose described.

82,984.—MERIDIAN TIME INDICATOR.—Edward Prevear, Leominster, Mass.

I claim the meridian arm, g, fitted to swing, in combination with the lens, i, and index, k, substantially as specified.

82,985.—CLAMP.—Elijah K. Purdy, Schoolcraft, Mich.

I claim, 1st, The floor clamp, consisting of the clamps, A, hinged together at B, and provided with prongs, C, the curved lever, D, and slotted lever, E, with holes, F, all constructed and arranged substantially as and for the purposes set forth.

2d, In combination with the above, the brace, A, provided at its lower end with a scarp serrated edge and hole, I substantially as and for the purpose described.

82,986.—CLAMP FOR SADDLERS, ETC.—William K. Rairigh, Rural Valley, Penn.

I claim the shaft, B, with its ratchet, D, the chamber, C, pawl, e, and spring, g, when arranged upon and made to operate the jaws of a clamp, substantially as and for the purposes specified.

82,987.—HARVESTER.—Amos Rank and Joshua H. Cox, Salem, Ohio.

We claim, 1st, The combination, substantially as set forth, in a two wheeled hinge joint harvester, of an overhung reel, adjustable vertically on a single post mounted on the shoe, with a driving shaft mounted on the reel post, and carrying a sliding pinion, for the purposes specified.

2d, The combination, as set forth, with the reel and reel post, of the clasp, I, bracket, i l, pinion, m, wheel, M, and driving shaft, L', whereby the reel can be raised or lowered without deranging the gearing.

3d, The combination, substantially as set forth, of the reel shaft and its driving shaft, with tangentially toothed gearing, for the purpose specified.

82,988.—CLASP FOR TRUNKS, ETC.—Louis Ransom (assignor by mesne assignment, to Louis Ransom and Eugene Hyatt), Lansingourg, N. Y.

I claim a trunk clasp, consisting of the two parts, A and B, the clasp tongue, c, and spring, d, constructed, combined, and operating substantially as described.

82,989.—GRAIN SEPARATOR.—P. N. Recker and Jos. Recker, Dayton, Ohio.

We claim, 1st, The triangular shaped horizontal bars, m m, and perpendicular bars, n n, constructed as described, and forming a frame, to be covered with wire netting, for the purpose of scouring grain, substantially as and for the purposes herein set forth.

2d, The wire netting, N, when constructed in sections, or otherwise, of square wire, and used substantially as and for the purposes herein set forth.

3d, The arrangement of the valve, a, rod, b, slotted bar, c, and screw, d, for the purpose of regulating the discharge of grain out of a tube, substantially as and for the purposes herein set forth.

4th, The arrangement of the chamber, D, with valve, e, and valve, g, covering the entrance to the chamber, G, constructed as described, and operating substantially as and for the purposes herein set forth.

5th, The arrangement of the hopper, H, passage, I, and valve, h, constructed as described, and operating substantially as and for the purposes herein set forth.

6th, The arrangement of the passage, Q, chamber, R, with its valve, w, and the valve, y, covering the entrance to the chamber, S, constructed as described, and operating substantially as and for the purposes herein set forth.

7th, The arrangement of the chambers, C D G Q R and S, passage, I, and the hopper, H, carrying the different currents of air through the chamber, E, and into the drum, F, substantially as and for the purposes herein set forth.

82,990.—PLOW.—Francis Reese, Elyton, Ala.

I claim the guide plate, and the combination of the scraper, hilling-plow, and other parts, as described.

82,991.—HARVESTER RAKE.—Thaddeus S. Reeve and Chas. D. Smith (assignor to themselves and Wm. Schwartz), Chicago, Ill.

We claim, 1st, The adjustable plate, C, in combination with the standard, D, sleeve, J, and lever, H, for supporting the reel, as fully set forth and shown.

2d, The boxed sleeve, J, oscillating on the standard, D, in combination with the adjustable lever, H, pin, A", or its equivalent, and slotted standard, F, substantially as set forth.

3d, The sliding section of the reel, M, slide, N, and lever, G, as fully set forth and shown.

82,992.—BABY JUMPER.—Charles Rich (assignor to Sarah A. Rich), Poughkeepsie, N. Y.

I claim, 1st, The rocking yoke, C, pivoted to the base, A, supporting the seat bar, D, and connected with the up and down adjustable spring, E, all made, arranged, and operating substantially as herein shown and described.

2d, The post, B, which carries the spring, E, when arranged in combination with the base, A, yoke, C, and seat bar, D, all made and operating substantially as herein shown and described.

3d, The bow shaped swinging railing, F, when attached to a standard, f, which is pivoted to the under side of the seat, and when fastened with its ends to the fixed horn, d e, substantially as and for the purpose herein shown and described.

4th, The projecting lugs, h, and the pin, i, in combination with the swinging standard, f, and rail, F, for locking the same, substantially as set forth.

5th, A baby jumper, consisting of the base, A, post, B, swinging yoke, C, spring, E, seat bar, D, saddle, G, horn, d e, and swinging rail, F, all made, arranged, and operating substantially as herein shown and described.

6th, The sliding foot rest, H, in combination with the wedge, j, and seat bar D, of a baby jumper, substantially as and for the purpose herein shown and described.

82,993.—PUNCHING MACHINE.—W. T. Richards, Bridgeport, Conn.

I claim the arrangement, herein described, of the gage levers, k and l, slotted plate, H, lever, I, and the punch stock or gate, C, as and for the purpose set forth.

82,994.—WRENCH.—Edwin P. Russell, Manlius, N. Y.

I claim the jaw, C, when operated upon the tongue, c, by means of the lever, B, the pin, p', and the slot, s.

82,995.—STANCHION FOR FASTENING CATTLE.—Larkin S. Safford, Hope, Me.

I claim, 1st, The manner of hanging the pieces, D E, loosely in the top piece, A.

2d, The yoke, L.

3d, The combination of the link, T, the yoke, L, the pieces, D E, and the top piece, A, substantially as and for the purpose set forth.

82,996.—GRAPE TRELLIS.—Abisha Scofield, Starkey, N. Y.

I claim, in combination, the post, A, socket, B, set screw, G, standard, C, arms, F F', and bars, D, arranged as and for the purpose set forth.

82,997.—TUMBLER WASHER.—M. Scrannage, Boston, Mass.

I claim, 1st, The swivel, K H H H, on the stem, E, arranged and operating as described, and for the purpose set forth.

2d, The rose, D, when provided with tangentially discharging orifices, d d', etc., operating in combination with the swivel, K H H H, arranged substantially as described, and for the purpose set forth.

82,998.—SWING.—George A. Seaver, New York city.

I claim the combination of the propelling rope or ropes with the movable handles or sliding sockets, substantially as described.

82,999.—WASHING MACHINE.—N. M. Shafer, New York city.

I claim the method of squeezing the suds through the clothes, by means of unresisting wire boxes, B and L, or their equivalent, in combination with the pump, H, E, and, D, as herein described and set forth.

83,000.—HORSE RAKE.—Geo. C. Shaler, Gilboa, and Harry Barlow, Herbert, N. Y.

We claim the platform, a, rigidly attached to the revolving axle, b, in which the curved teeth are fixed, and the platform, c, hung between the projections d d, of the axle tree, and carrying the clearers, e, as herein shown and described, whereby, as the driver steps from a to c, the latter is depressed, the axle partially turned, and the teeth and clearers operated as set forth and shown.

83,001.—Jacob J. Smith, Philadelphia, Pa. Antedated October 1, 1868.

I claim, 1st, An elastic bed bottom, consisting of a series of separate wooden slats, B B, arranged parallel with each other and with the side rails of the bedstead, and having a round knob, b', fixed near each end, in the middle of the width of the under side of each slat, B, and the said slats suspended by means of two single cords, C and C', which respectively pass in a strained or stretched manner from the knobs, b', of the slats to like knobs, a'', fixed in the head and the foot rails, A A', in the zigzagged or laced manner shown and described, for the purpose specified.

2d, In combination with the mechanical devices claimed in the preceding clause, the winding apparatus, D, arranged to operate substantially as and for the purpose described.

83,002.—HORSE RAKE.—John B. Smith, Newton, assignor to himself, J. B. Stevens, and U. G. Stevens, Jasper county, Ill.

I claim the levers, D D, in connection with the slides, f f, and clutches, D x, oblique arms, h, at the front ends of the levers, the crank ends, i, of shaft, E x, and the projections on the slides, f, and thills, all arranged to operate in the manner substantially as and for the purpose specified.

83,003.—DUMPING WAGON.—George R. Sneath and C. H. Sneath, Wilmington, Del.

We claim, 1st, The combination, in a dumping wagon, of the box, A, hung on trunnions, with bed frame timbers, h h, cross bar, t, bent axle tree, s, all operating substantially as shown and described, and for the purpose set forth.

2d, The crank shaft, v', and hinged bolts, v v, arranged to operate as herein described, for the purpose specified.

3d, The bed frame of a dumping wagon, when composed of the parts, h h, t, i i, u u, and j, arranged as herein described.

4th, The arrangement of the frame, l l o, with the fifth wheel, k, and springs m n n, substantially as described, when forming part of the running gear of a dumping wagon, substantially as herein described.

83,004.—TOY PISTOL.—Greenleaf Stackpole, New York city.

I claim a pistol or gun, having the spring trigger, E, and slot, A, in combination with the rubber band, B, and plunger, F, when the parts are constructed and operated substantially as set forth.

83,005.—WAGON AND CAR UNLOADER.—Noah Swickard, Galva, Ill.

I claim, 1st, The slotted platform, A, in combination with the pivoted balance bars, B B, board, C, end bars, I I, and stops, H H, all constructed and operating substantially as and for the purposes herein set forth.

2d, The pivoted balance bars, B B, provided with one or more self-acting dogs, G, in combination with the spring toggle keys, E E, and key, F, all constructed and operating substantially as and for the purposes herein set forth.

2d, The arrangement of the slotted platform, A, balance bars, B B, and lid, D, to the hopper, substantially for the purposes set forth.

83,006.—RAILWAY CAR BUMPER.—Joseph Tanney and John H. Brown, Bangor, Me.

We claim the rubber spring, D, when constructed as described, and inserted into the drawhead, C, substantially as and for the purposes herein set forth.

83,007.—HAY ELEVATOR.—Nelson C. Thomas and Jacob H. Coe, Brighton, Mich.

We claim the conveyer, H, when constructed as described, traveling on the rope, D, provided with stop, F, having pivoted in it the lever, N, and operating in combination with the ropes, S and J, screw bolts, A, with hand nuts, E, and blocks, G G, all arranged and operating substantially as described.

83,008.—SCHOOL DESK AND MUSICAL INSTRUMENT.—W. O. Trowbridge, Newton Corner, assignor to "Mason and Hamlin Organ Company," Boston Mass.

I claim, in comoination with a desk a keyed musical instrument, so arranged that its keys may be concealed from view, or may be brought into position for playing substantially as set forth.

83,009.—WATER WHEEL.—Jesse Tucker and Abel B. Palmer, Adrian, Mich.

We claim a water wheel, having three series of buckets, C d and e, constructed as shown, and arranged in relation to each other, substantially as and for the purposes set forth.

83,010.—BRICK MACHINE.—Peter Walrath and Jesse Walrath, Chittenango, N. Y.

We claim the grind mill and crowding devices, a b c, endless chain of molds, D D, with movable bottoms, d, delivering wheel, L m, press, l H, with the intermittent operating devices, F f2 G2, and ratchet, e, with throwing devices, F f G, all constructed and operating as herein described for the purpose set forth.

83,011.—ANIMAL TRAP.—A. L. Waring, Coshocton, Ohio.

I claim the described trap, consisting of the box, A, having the hinged covers, b b b, arranged as described, and diaphragm, B, with points, z z, arranged as described, the whole being combined as and for the purpose set forth.

83,012.—RECLINING CHAIR.—John W. Wetherbee, Charlestown, assignor to himself and Richard Rowse, Chelsea, Mass.

I claim, in combination with the stationary seat frame and stationary arms, the swinging back, e, and foot-and-leg frame, f, pivoted to the side frame and jointed together by links, k, and moved from vertical to inclined or horizontal position, or *vice versa* (one frame by the other), substantially as described.

Also, in combination with the adjustable back and foot piece and stationary seat, the links, k, the notches, m, and latch, n, arranged to operate substantially as set forth.

83,013.—AUTOMATIC BOILER FEEDER.—John R. Widgeon and Fred. E. Frey, Bucyrus, Ohio. Antedated September 26, 1868.

We claim the combination of the case, Q, with the chamber, A, having ports, l m, and the seat, B, provided with holes, d e f g, substantially as herein described.

83,014.—AUTOMATIC PUNCHING MACHINE.—John E. Wiggin, Stoneham, Mass. Antedated September 26, 1868.

I claim, 1st, In combination with a punching device, an automatic intermittent moving feed, to which the material to be punched is affixed, substantially as and for the purpose described.

2d, Also, the combination of the coupling, i k, with the work-feeding device through the piece x, the rocker, y, lever, l l', latch pull, o, and spring, n, or their equivalents, substantially as described.

3d, Also, the combination of the brake, m, with the lever, l l', spring, n, and fixed part, k, of the coupling.

4th, Also, the combination of a segmental rack with clamping jaws, substantially as described.

5th, Also, the combination of the piece, h', with the pull, o, for throwing the pawl, w, out of gear with the rack.

6th, Also, the employment of a friction-applying device, arranged to operate on rack, t, to steady its movement, and to prevent it from moving beyond the distance intended, substantially as described.

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83,015.—CHURN DASHER.—Samuel Yates, Marshall, Mo.

I claim the combination of the hollow or tubular shaft, A, with air chamber, B, valve, C, dasher, D, and air tubes, E, as constructed and arranged substantially in the manner and for the purpose described.

83,016.—STEAM GENERATOR.—V. D. Anderson, Milton, Wis.

I claim, 1st, The arrangement of the parts, A and B, when constructed and oined together, substantially as set forth.

2d, The arrangement of the boilers, A and B, and the reservoir of the superheater, Q, substantially as described.

83,017.—GAITER BOOT.—W. H. H. Babbitt, New Corner, Ind.

I claim, 1st, In combination with a gaiter, the plates, A and E, and the folding leather, D, arranged substantially as described, for the purpose set forth.

2d, The flap, G, in combination with the plates, A and E, arranged and operating substantially as described, for the purposes set forth.

83,018.—DEVICE FOR UNLOADING HAY.—Joseph Backus, Greenvale, Ill.

I claim the derrick, A B C, in combination with the beam, D, chain, d, and hooks, e and F, all made and operating substantially as herein shown and described, and for the purpose of unloading hay from wagons, as set forth.

83,019.—WIRE CLOTH.—Thomas Baggott, Baltimore, Md.

I claim the production of wire cloth, constructed as herein described whether the ends of the webs are joined together or not, as an article of manufacture.

83,020.—LEACH TUB.—Wm. Banzett, Brooklyn, N. Y.

I claim a leach tub, constructed as described, namely: with the cover, C, battened around its edges on top, and having the hinged portion, c, and held by the clamps, B, having beveled forward ends, said clamps being hinged to the ears, a, which are secured to the sides of the tub, all arranged as herein shown for the purpose specified.

83,021.—COMBINED HATCHET, HAMMER, AND SCRAPER.—Arthur Barbarin, New Orleans, La.

I claim, as a new article of manufacture, a combined hammer, nail puller, hatchet blade, and scraper, formed of one piece of metal, substantially as herein shown and described.

83,022.—BOX OPENER.—Arthur Barbarin, New Orleans, La.

I claim the herein-described tool for opening cigar boxes and other articles as a new article of manufacture.

83,023.—SHOEMAKERS' IMPLEMENT.—Arthur Barbarin, New Orleans, La.

I claim, as a new article of manufacture, a tool, the shank and handle of which are combined with the hammer head, claws, and rotary cutting disk, with or without the screwdriver, in the manner and for the purposes set forth.

83,024.—LIQUID SAMPLER.—Arthur Barbarin, New Orleans, La.

I claim, 1st, The combination of the induction tube of a siphon with a discharge pipe provided with a throat for receiving said induction tube, a vacuum-creating rubber bulb, and stop cock, c d", located, one on each side of said throat, with or without the reservoir, C, between them, substantially in the manner and for the purposes shown and set forth.

2d, The receiving chamber or reservoir, C, arranged between the induction end of the pipe and the rubber bulb, substantially in the manner herein shown and for the purpose described.

3d, Providing the liquid-receiving chamber or reservoir of the siphon or liquid sampler with a discharge tube and cock, as shown in fig. 4, of the accompanying drawings, by means of which the liquid in said chamber can be drawn off, substantially as and for the purposes specified.

4th, The combination, with the screw-threaded end of the siphon, of a nut, grooved and provided with pins, by which the said siphon may be held to the vessel to which it is applied, substantially in the manner herein shown and set forth.

5th, A liquid sampler, consisting of a hollow rubber bulb, in combination with a tapering tube provided with a stop cock at or near the point where it is united with the said bulb, with or without a reservoir of glass or other suitable material interposed between the said stop cock and the open end of the said tube, substantially as and for the purposes herein shown and specified.

83,025.—SOFA BEDSTEAD.—W. P. Barclay, Chicago, Ill.

I claim, 1st, Constructing the back of a sofa so that the same forms a complete bed, substantially as specified.

2d, The frame, C C', D D', in combination with the seat and ends of the sofa, and forming the back thereof, and pivoted to the ends, so as to turn forward, substantially as and for the purposes specified.

3d, The folding head and foot boards herein described, in combination with the frame, C C' D D', and ends and seat of a sofa, substantially as and for the purposes specified.

4th, The supporter, f, in combination with the headboard herein described, and frame of the back of the sofa, substantially as and for the purposes set forth.

5th, The jointed arm, I J, constructed substantially as and for the purposes specified.

6th, The pieces, C C', in combination with the end pieces, E, of a sofa, and slats, a, when so constructed as to form both the back of a sofa, and also a complete bed, substantially as described.

83,026.—GAS GENERATOR.—J. A. Bassett, Salem, Mass.

I claim an apparatus for charging air with hydro carbon vapor, automatically revolved by the weight of the column of vapor, and used in combination with the chamber, C, substantially as set forth

83,027.—PUMP.—W. D. Baxter, New York city.

I claim the pistons, e, and yoke pieces, p, actuated by the rollers, o, and lever, l, in combination with the pumps, d d, and water way, f, provided with stuffing boxes for the piston rods, n, and an air vessel, k, the parts being arranged and constructed substantially as specified.

83,028.—PIPE-MOLDING MACHINE.—Benjamin S. Benson, Baltimore, Md.

I claim, in combination with a revolving flask, a non-revolving but rising and falling screw packer, which rests upon and rises with the sand packed in the flask, and is guided in its rising, substantially as and for the purpose set forth.

83,029.—PACKER FOR PACKING SAND IN MOLDERS' FLASKS.—B. S. Benson, Baltimore, Md.

I claim the packing instrument, with a screw thread of gradually diminishing pitch from the first end, and a zinc or other soft metal or alloy of meal fillet under and around it, as and for the purpose herein described and represented.

Also, in combination with the screw thread and fillet, the sectional and removable steel plates, D and E, substantially as and for the purpose described.

83,030.—PLOW.—M. Berdan, Maumee City, Ohio.

I claim the slotted bar, F, and screw rods, E and H, so arranged that the share, G, can be adjusted both vertically, laterally, and longitudinally, as specified.

83,031.—COMPOUND FOR INSULATING TELEGRAPH AND ELECTRIC WIRES.—S. C. Bishop, New York city.

I claim the insulating compound for telegraph and other electric wires or conductors, composed of the ingredients described, in, or about in, the proportions specified.

83,032.—WAGON BRAKE.—S. R. Bolton, Prescott, Wis.

I claim, 1st, The brake shoe, e, constructed as described, with its rear face inclined downward, and sliding by the dovetailed edge, i, and bent plate, h, upon the rollers, g, in the box, f, all arranged as described for the purpose specified

2d, The arrangement of the bent lever, j, connecting rods, k l m, lever, n, spring, p, rod, o, guide iron, d, brake bar, a, box, f, and sliding shoe, e, all operating as described for the purpose specified.

3d, The arrangement of the brake bar, a, sliding by means of staples upon the guide iron, d, the box, f, rollers, g, and sliding shoe, e, as herein described, for the purpose specified.

83,033.—CORN HUSKING MACHINE.—David Bookwalter, Gardner, Ill.

I claim the combination of the rollers, A, provided with the grooves, a, and the teeth, B, and the shields or cleaners, C, all constructed and arranged as shown and described.

83,034.—FOLDING CHAIR.—Asahel C. Boyd, Grafton, Mass.

I claim the standards, A A, B B, pivoted at a a, and provided with strengthening rounds or cross bars, in combination with the pieces, H H, curved hinges, I I, or their equivalent and hinged connecting rods or plates, J J, when the several parts are constructed to operate in the manner and for the purposes above described.

83,035.—VELOCIPEDE.—Chas. K. Bradford, Lynnfield, Mass.

I claim, 1st, Connecting the body of a velocipede to its driving shaft, in such manner as to vary the position of such body, and its seat, with respect to such driving shaft, in manner and for the purpose as hereinbefore explained.

2d, Combining with a velocipede a compound crank, or series of cranks, or eccentrics of different radii, for enabling the speed and power of the vehicle to be varied, essentially as herein shown and described.

3d, The arrangement of the rope, n, or its equivalent, as affixed to the forked bar, m, and supported and guided by the guides, o o1 o2 o3 o4 o5, or their equivalents, substantially as before described, and herein shown.

4th, The combination, with the body of a velocipede, of a seat adjustable thereon, substantially in the manner and for the purposes set forth.

5th, The combination of the body of a velocipede, formed as described, and its adjustable seat, with a compound crank, or its equivalent, substantially as and for the purposes set forth.

83,036.—PLOW.—James Campbell, New Town, Ill.

I claim, 1st, The partially revolving square beam, B, carrying plows or shovels, secured to the plow frame at an acute angle to the line of the draft, constructed and operating substantially as and in the manner set forth.

2d, In combination with the above, the stirrups, F F, lever, D, notched bar, E, brace chains, M M, cross piece, P, and the angle axles, N N, the whole arranged and operating substantially as set forth.

83,037.—COMPOSITION FOR FORMING BUILDING BLOCKS, PAVEMENTS, TILES, ETC.—Samuel E. Carr, Danville, Pa.

I claim an improved composition for forming building blocks, pavement tiles, etc., formed of the ingredients, and in the proportions and manner substantially as herein set forth and described.

83,038.—FENCE.—J. M. Chaplin, Middleport, N. Y.

I claim the wires, C C, with the wheels, E E, spring, D, and pickets, B, all arranged in connection with the posts, A A', substantially as and for the purpose set forth.

83,039.—CHILD'S PEDAL FOR PIANOS, ETC.—Carl August Class, St. Louis, Mo.

I claim the stool, A, and the pedal slides, B, when employed as and for the purpose described and set forth.

83,040.—DROPPER FOR HARVESTER.—George R. Clements, Prescott, Wis.

I claim the lever, H, composed of two parts, 11', connected by a pivot m, in combination with the cut-off and grain discharger, connected to said lever in the manner substantially as and for the purpose specified.

83,041.—HAMES FOR HARNESS.—D. Clemons, Scranton, Pa.

I claim the lever, E, hook, F, and holding ring, G, in combination with the chain, D, and the lower end of the hames, A, substantially as shown and described, and for the purposes specified.

83,042.—CAR BRAKE.—Joseph Cockshoot, Jr., and Henry Weatherill, Manchester, Great Britain. Antedated October 10, 1868.

We claim the combination of the longitudinal bar or plate, b, and its racks, the pinions on the axles, and the springs, m m, the whole being arranged and applied to a railway car, substantially as and for the purpose herein set forth.

83,043.—AIR SPRING.—Jackson Corriston, Sandusky City, O.

I claim an air spring, constructed as herein described, and provided with the valve, f, in combination with the spring, A B, composed of metallic disks, substantially as and for the purpose set forth.

83,044.—WATER WHEEL.—Gardner Cox, of Pierpont, N. Y.

I claim the buckets, G, composed of three parts, a b c, arranged as shown, when said buckets are attached to the concave periphery of the hub or body, F, of a wheel, as and for the purpose herein set forth.

83,045.—VISE.—John C. Crumpton, Philadelphia, Pa.

I claim, 1st, The bed piece, A, jaw, B, and shield, C, when cast in one piece, and provided with the slots, D D, substantially as and for the purpose described.

2d, The combination, with the same, of the sliding jaw, F, when fitted to operate in connection therewith, and provided with the nut, G, substantially as and for the purpose described.

3d, The arrangement of the cap, I, and screw, L, and stationary jaw, B, with the remaining vise, in the manner and for the purpose described.

83,046.—GATE.—Stephen S. Davis, Edgerton, Wis.

I claim the combination of the wires, a a, levers, F F, and handles, G G, or their equivalents, for the purpose of opening and closing the gates, C C, substantially as herein set forth.

83,047.—FEEDING ROLLER FOR CIRCULAR SAWS.—E. C. Dicey, Montague, Mich.

I claim the feed roller for edging saws, provided with V-shaped grooves and projections at right angles to its axis, for the purpose of preventing lateral movement of the board while being fed to the saws, as herein shown and described.

83,048.—FISH BAIT CUTTER.—Valentine Doane, Jr., Harwich Port, Mass.

I claim a mill for cutting fish bait, having cylinder, A, plates, f and h, and the series of knives connected therewith, as described and shown; plank, C, block, D, bottom, E, and cover, K, constructed and arranged substantially as specified.

83,049.—COAL STOVE.—C. S. Doolitell, Mansfield, Ohio.

I claim, 1st, The arrangement of the air pipe, C, fire chamber, B, slotted pipe, H, and flattened flues, F, whereby the current of air entering the pipe, C, is heated in its passage through the fire chamber, and distributed through the slotted pipe, H, into the series of flattened flues, E, where it mingles with the cool air entering said flues through the pipes, D, as herein shown and described.

2d, The flattened air flues, E, constructed as described, and arranged in respect to the outer case, F, and egress draft openings of the fire chamber, B, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the slotted pipe, H, with the flattened flues, E, and with the pipe or pipes, C, passing through the fire chamber, B, substantially as herein shown and described, and for the purpose set forth.

4th, The combination and arrangement of the air pipes, D, with the fire chamber, B, and with the flattened flues, E, substantially as herein shown and described, and for the purpose set forth.

83,050.—CHURN.—William C. Douthett, Rochelle, Ill.

I claim, 1st, The double oscillating or swing joint, when constructed substantially as above described, and for the purposes set forth.

2d, The hub, P, in combination with the adjustable rod, F, arms, H, ring, I, piece, K, and rod, O, all operating to regulate the length of the stroke of the dasher, C, as well as to produce the stroke itself, substantially as described.

83,051.—PUMP.—C. H. Dreyer, Nashville, Tenn.

I claim the fixed piston, D E, constructed of two parts, and provided with the valves, a and b, c and d, and their passages, e f g, and h i, leading to the lower and upper parts of the cylinder, and the passages, k l, all substantially as and for the purpose described.

86,052.—AUTOMATIC CAR COUPLING.—Albert J. Elder, Kansas city, Mo.

I claim the spring bar, D, when provided with the hook, m, and arranged in the open draw head, A, to operate in connection with the tooth, a, in the manner and for the purpose specified.

83,053.—WINDOW SHUTTER.—Frederick Engel, Romeo, Mich.

I claim a window shutter, composed of metal plates, C, which are separately formed with rolls and overlapping edges, and connected by metal rods, D, forming hinges that work in opposite directions, and when folded up, constituting a roof to shield the window from snow or rain, all as herein shown and described.

83,054.—OAT-DUSTING MACHINE.—Richard Exelby, and George W. Marshall (assignors to themselves, John S. Lacy, Jr., and John A. Seymour), Buffalo, N. Y.

We claim the arrangement of the hopper, K, rod and valve, y w, vibrating screen, R, operated by eccentric, t, and rod, u, pipe, k, fan, J, distributing board, x, beaters, I, crank, q, and gearing, p o m l, forming a portable oat dusting machine, constructed as herein set forth.

83,055.—SAFETY BRIDLE.—E. R. Ferry, New Haven, Conn.

I claim, 1st, The check bars, E E, provided with the levers, c c, for the passage of the driving reins, when connected to the bar, a, by the swivel joint, b, whereby either rein is adapted to be pulled to guide the horse, without pressing the check bars against the sides of his mouth, as herein shown and described.

2d, The combination of the detachable check rein, J, with the driving reins, I, when said parts are used in connection, or applied with the check straps, D D, and the bit, F, all arranged substantially as and for the purpose specified.

83,056.—CARRIAGE CURTAIN FASTENING.—John C. Fish, Barnstable, Mass.

I claim a carriage curtain having button holes, each with an inserted elastic across the head of the slit thereof, substantially as shown and described.

Also, in combination with each button, having an oblong crown shaped head, an elastic, which holds the edge of the eye close to the sides of the shank, substantially as shown and described.

83,057.—CHURN.—Nathan C. Folger, New Orleans, La.

I claim the arrangement of the churn, A, with relation to the rockers, D, when the latter are provided with the springs, F, and all the parts are constructed and united in the manner and by the means substantially as herein described, for the purpose set forth.

83,058.—TOY PISTOL.—Wilmer D. Gridley, New Britain, Conn.

I claim the barrel and stock, a b, in one piece, spring, e, trigger spring, 1 f, spring, g, and orifice, d, substantially as and for the purpose described.

83,059.—HORSE POWER.—John A. Haffner, Commerce, Mo.

I claim the combination of the shaft, C, wheel, F, or casing, D, and coiled spring, a, when said spring is provided with an interior coiled rubber spring, e, to support the exterior spring, and relieve the strain thereon, all substantially as shown and described.

83,060.—ENGINE GOVERNOR.—William S. Henson, N.Y. city.

I claim the revolving spindle, A, collar, F, and ball, K, connected to which are the forked arms, C C, cross heads, M M, balls, D D, and pivoted bars, I I, the several parts being constructed, arranged and operating substantially in the manner as specified.

83,061.—PLOW.—Rozander S. Higgins, Olney, Ill.

I claim the combination of the prolonged colter, I, with its rearwardly curved cutting point, i', and the obliquely presented share, D, so arranged that its sole does not run in contact with the floor of the furrow, all constructed and operating as and for the purposes herein specified.

83,062.—IRON DOOR.—Lewis Hover, Chicago, Ill.

I claim the combination of the outer and inner doors, B B, and their cogged hinges, A A, when secured by the double latch, D, or its equivalent, all substantially as and for the purposes herein shown and specified.

83,063.—HORSE HAY FORK.—C. A. Howard, Pontiac, Mich.

I claim, 1st, The parts, A and B, of a horse hay fork, provided with corrugated, grooved, or otherwise roughened surfaces, arranged to be locked together in any preferred position, by a lever and inclined ways, substantially as and for the purpose described.

2d, The combination with the parts, A and B, arranged to be locked as described, of a spring for separating them for unlocking, substantially as and for the purpose described.

83,064.—GEARING FOR GRINDSTONES.—Francis Howlett, West Rupert, Vt., and Charles R. Sherman, Salem, N. Y.

We claim the slotted adjustable block, G, carrying the wheel, E, and adapting it for adjustment with the pinion, D, substantially as and for the purpose described.

83,065.—PUMP.—Chas. W. Hoyt, South Norwalk, Conn.

I claim the arrangement herein shown and described of the operating lever E, chains, D, pulleys, a b, and brake, C, with relation to the double acting pump, A B, all as set forth, for the purpose specified.

83,066.—FUEL FROM SPENT TAN BARK.—Benjamin Irving, New York city.

I claim the new manufacture of compressed fuel from spent or refuse tan bark, by the method or process of forming it into blocks, or other suitable shapes, for fuel and transportation, substantially as hereinbefore described.

83,067.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—D. W. Jameson, Warren, Ohio.

I claim the standards or arms, F, hinged or pivoted to the bridge tree, E, in combination with the adjustable frame, G, arranged and operating conjointly, as and for the purpose substantially as set forth.

83,068.—HORSE HAY FORK.—C. H. B. Kellogg, Tontogany, Ohio.

I claim a hay fork constructed and operating substantially as shown and described, that is to say, with the head, A, central rod, B, hooks, C C, rods, E E, catch, i, and lever, K, arranged substantially as described, for the purposes set forth.

83,069.—CAKE MIXER.—James Lafetra, New York city.

I claim the arrangement of the beater, D E, and the quadrangular yoke, E, bearing the standing fingers, G, suspended from the cover, B, in such a manner that the beater is permitted to revolve while the yoke, F, and its fingers remain stationary, as herein described, for the purpose specified.

83,070.—PACKING CAN.—N. P. Lindergreen, Boston, Mass.

I claim as a new article of manufacture, and octagonal sheet metal can, having four narrow and four wide sides, made of four sheets of metal connected by joints, constructed and arranged as herein shown and described.

83,071.—SPADE.—Johan Linnemann, Copenhagen, Denmark.

1 claim, 1st The blade of a spade constructed with one or both of its vertical edges serrated, substantially as described.

2d, In combination with the blade and handle socket of a spade, a detachable handle, B, substantially as and for the purpose set forth.

83,072.—WORK TABLE APPLIANCE.—J. G. Lucas, Newark, N.J.

I claim the device or appliance composed of the annular spool holder, B, pin cushion, A, mirror, E, scissors holding clasps, d, emery case, C, serving also as a thimble holder, and thread cutter, D, the whole arranged substantially as and for the purpose specified.

83,073.—COMPOUND FOR TANNING.—Samuel Lusten, Linesville, Pa.

I claim the compound composed of the above ingredients, combined in the proportions set forth.

83,074.—ANIMAL TRAP.—Wilson McClure, Sinking Spring, Ohio.

I claim the described arrangement of the spring, H, roller, G, bar, D, cross head, E, spikes, F, spring, K, roller, J, trip lever, f, and bait rod, L, with relation to each other, the bottom, A, posts, B, sides, C and removable casing M, all operating as described, for the purpose specified.

83,075.—LINE HOLDER.—D. W. C. McMaster, Southborough, Mass.

I claim the disks, B C, constructed as described, with the radial ribs, and arranged with relation with each other and the fixture, A, in the manner herein set forth, for the purpose specified.

83,076.—DEVICE FOR HEATING RAILROAD CARS.—Francis Meddock, Mainsville, Ohio.

I claim the steam chamber, B, beneath the car floor, traversed longitudinally by steam pipes, D, which are attached, as between adjacent cars, by flexible connections, E, and which are provided in the chamber of each car with branch pipes, F, and valves, g, operateable from the inside of the car, and adapted to be closed or opened, as the necessities of each car in the train may require, substantially as described.

83,077.—GRAVE MOUND.—Jonathan Meley, Trenton, Tenn.

I claim the grave mound, when formed by coating the raised portion, A, with a layer of cement, enclosed by the brick border, and covered with a compact coating of shells, C, as herein shown and described.

83,078.—MACHINE FOR BENDING WOOD.—Joshua Merrill, Boston, Mass.

I claim, in combination with the toothed feed roll, b, the concave shaper block, c, constructed and arranged relatively to the roll, substantially as shown and described.

Also, in combination with the toothed feed roll, a sharper block, made adjustable, substantially as set forth.

83,079.—BALING PRESS.—John F. Milligan, St. Louis, Mo.

I claim combining the screw threaded shaft, D, sectors, D', and platen, C, the toggle levers, G, and rods, E, in the manner herein shown and described.

83,080.—CHURNING APPARATUS.—Ed. J. Moore, Westfield, N. Y.

I claim, 1st, The combination of the pivoted bars, J, H, F, and G, with the lever, E, and dasher shaft, I, substantially as described, for the purpose specified.

2d, The combination of the connecting rod, L, with the heavy or weighted lever, K', and with the parallel levers or bars, F, substantially as herein shown and described, and for the purpose set forth.

3d, Extending the pivoted bars, H, above the lever, E, and connecting them with the dasher handle, I, by means or the short connecting bars, J, substantially as herein shown and described, and for the purpose set forth.

4th, Extending the heavy or weighted lever, K, through the upright, D, and pivoting it at or near its center, substantially as herein shown and described.

83,081.—NUT LOCKING DEVICE.—Wm. Morehouse, Buffalo, N. Y.

I claim the forked nut locking device, D, constructed with a shoulder, b', and with separated portions, b b, substantially as and for the purpose described.

83,082.—MACHINE FOR TURNING BROOM HANDLES.—G. M. Morrow, Clarksville, Ohio.

I claim, 1st, Controlling the cutters, through the medium of the plates, sliding at right angles to each other, the catches, n n', and the cam wheels, E, constructed to operate substantially as described.

2d, The combination of the sliding plates, M M', N N, catches, m m', n n', wheels, E, having flanges, n", and shaft, E', with the hollow mandrel, K, pivoted lever, r a, link, r', cutters, l l", and springs, s s', substantially as described for the purpose specified.

83,083.—COMBINED HUB AND BOX FOR WHEELS.—Samuel Mosher, Winchester, Ill.

I claim the combination of set screws, e, with flange, C, and washer, s, the whole constructed and arranged substantially as specified.

83,084.—LADDER.—P. M. Papin, St. Louis, Mo.

I claim the rail, A, spreading feet, A1, sliding feet, A2, truss rods, b, cross bar, b1, angle blocks, b2, and hook, C, the whole being combined and arranged in the manner described and for the purpose set forth.

83,085.—COOKING STOVE.—Alexander G. Patton, Troy, N. Y.

I claim, 1st, A stove, so constructed as to embrace within itself a water-heating reservoir, and a warming closet, both of which form a constituent part of said stove, the same being arranged substantially as shown and described.

2d, The flue, 8, formed in the water reservoir, substantially as and for the purpose shown and described.

3d, The construction of the vertical descending flue or flues, 2 2, for directing the greatest portion of the heat towards the ends of the oven, by means of the curved form of the fixed reservoir plates, as shown and described.

4th, The arrangement of the fixed water reservoir, with reference to the flues, 6 and 7, which surround said water reservoir, substantially as shown and described.

5th, The arrangement of the damper, 9, with reference to the flue, 8, and the additional aperture in the cover, G, of the stove.

6th, The arrangement of the flues, 1, 2, 3, 4, 5, 6, 7, and 8, substantially as and for the purpose described.

83,086.—COOKING STOVE.—Alexander G. Patton, Troy, N. Y.

I claim, 1st, A stove, having combined within it a second or extra oven and a water heating reservoir, which form constituent parts thereof, substantially in the manner shown and described.

2d, The combination of the water reservoir, E, and the second or extra oven F, when forming fixed or permanent parts of a cooking stove, and arranged substantially as and for the purpose specified.

3d, The arrangement of the flues, 1 2, 3, 4, 5, 6, and 7, with reference to the ovens, C F, and water reservoir, E, when constructed as herein shown and described.

83,087.—HAMES FASTENER.—Wm. H. Payne, Janesville, Wis.

I claim, 1st, Drawing the hames together by means of a levered cog wheel D C, and toothed bar, A, substantially as herein shown and described.

2d, The combination of the toothed bar, A, cap, B, cog wheel, C, (having a lever, D, formed upon or attached to it), and slotted bar, E, with each other substantially as herein shown and described, and for the purpose set forth.

83,088.—DAMPING APPARATUS FOR COPYING PRESS.—Adolph Peari, New York city.

I claim the combination of the leather covered dampening roller, B, the moistened cushion, D, and the water bath in the case, A, substantially as described, and for the purpose herein set forth.

83,089.—PLANING MACHINE.—F. K. Plumbly, Buffalo, N. Y.

I claim the combination of the hand plane, A, with the suspending rod, B, box, D, rest pin, C, and gage block, E, all constructed to operate substantially as described.

83,090.—AWNING.—Royal P. Pratt, Hartford, Conn. Antedated October 6, 1868.

I claim, 1st, The combination of the pulley, D, and end block, G, with the rods, I and J, when constructed and arranged substantially as herein described, for the purpose of winding up and sustaining an awning.

2d, The cords, m n o p q, arranged as herein described, for the purpose of raising and folding under the end flaps of an awning.

3d, The combination of the cord, m n o p q, the slotted tube, K, and the spring, s, or its equivalent, constructed and operating substantially as herein specified.

83,091.—ELECTRICAL AMALGAMATOR.—Julio H. Rae, Syracuse, N. Y.

I claim the drum, A, provided with a lining and with a heater, representing the two elements of a galvanic battery, said heater serving also to bring all the particles of the pulverized ore in intimate contact with the mercury substantially as herein shown and described.

83,092.—CONDENSER.—Franklin Ransom, Buffalo, N. Y.

I claim, 1st, The arrangement with the condenser, A, and main induction-pipe, B, of the overflow pipe, d, and small pipes, d1 d2, as herein set forth.

2d, The arrangement of the secondary injection pipe, I, in relation to the partitioned condenser, A, and boiler feed pipe, J, as set forth.

83,093.—CORN CULTIVATOR.—Edward F. Rate, Cedar County, Iowa.

I claim the levers, A and J, roller, F, and regulating bars, D, when constructed and arranged substantially as and for the purposes herein specified.

83,094.—ANIMAL TRAP.—Edward Reichard, Washington, Mo.

I claim, 1st, The trap, formed of the base, A, the fixed lobe, B, journal, D, spring, E, and movable lobe, C, substantially as and for the purposes set forth.

2d, The combination of the trip lever, f, the spring, c, its cam, c1, and detent spring, b, substantially as and for the purposes set forth.

3d, The spring catch, G, in combination with the lobe, C, when arranged to secure said lobe to the base plate, A, by the detent, g, substantially as set forth.

83,095.—VALVE MOTION FOR STEAM ENGINES.—Hugh Reid, St. Louis, Mo.

I claim, 1st, The forked rod, D, its ends, d, slotted at d', the pins, e, with the toggle links, E, cross head, F, and spring, G, combined substantially as set forth.

2d, The rock shaft, B, in combination with the rod, D, links, E, valve stem, c, and valve, C, substantially as set forth.

3d, The combination of the valve, C, the exhaust pipe, A, the discharge pipe, H, and atmospheric valve, I, as set forth.

83,096.—FANNING MILL.—Geo. Richards and David Strickland, Richland Center, Wis.

We claim, 1st, The adjustable sliding flanged board, K, constructed

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arranged substantially as herein shown and described, in combination with the shoe, I, as and for the purpose set forth.

2d, Suspending the shoe, I, in the center of the shoe chamber, by means of the springs, J, substantially in the manner herein shown and described, and for the purpose set forth.

3d, The combination of the sliding gate, M, connecting rod or rods, N, lever, O, and ratchet bar, P, with each other and with the opening in the top of the case, A, substantially as herein shown and described, and for the purpose set forth.

4th, The rectangular hopper, Q, constructed and arranged substantially as herein shown and described, in combination with the hopper shaped top of the case, A, as and for the purpose set forth.

5th, The fans, D, formed with projecting wings, d', upon their central parts, substantially as herein shown and described, and for the purpose set forth.

6th, The bag-holder, W, constructed substantially as herein shown and described, in combination with one of the posts, B, of the frame of the mill, as and for the purpose set forth.

7th, The receiving measure, formed by the combination of the sliding gate Y, and rod, Z, with the box, X, substantially as herein shown and described, and for the purpose set forth.

83,097.—POCKET SAFE FOR FRICTION MATCH CORD.—Wm. H. Rogers, New York city.

I claim the match safe, A, constructed substantially as described, or in any equivalent manner, whereby the coil match and the tube, E, may be properly secured and used, substantially as set forth.

In combination with a friction-match cord, the tube, E, either hinged or attached to a match-safe or box, or not, and either cut away on one or both sides, substantially as and for the purposes described.

83,098.—FRUIT PICKER.—Jeremiah Schroy, Fortville, Ind.

Antedate October 2, 1868.

I claim the curved metal plate, C, connected to the outer ends of the irregular shaped hoop, B, and provided at its upper portion with a series of narrow slots for forming the comb teeth, pointed as shown, and used in combination with the pole, A, and conveyer, F, to operate substantially as set forth.

73,099.—BEER COOLER.—Louis Schulze, Louisville, Ky.

I claim, 1st, A beer cooling apparatus, consisting of a series of contiguous and connecting double bottomed pipes or channels, one above another, in vertical line, and inclined towards each other, when said pipes or channels are made with square sides and bottoms substantially as and for the purposes set forth.

2d, A beer cooling apparatus, consisting of a series of contiguous and connecting double bottomed pipes or channels, one above the other, in vertical line, the water channels of which, at the contiguous ends, are so constructed that they can be opened, substantially as and for the purposes set forth.

3d, A beer cooling apparatus, consisting of a series of contiguous and connecting double bottomed pipes or channels, one above the other, in vertical line, the water channels of which, at contiguous ends, are closed by a packing of water-proof material, non-conductor of heat, substantially as and for the purposes described.

4th, In a beer cooling apparatus, the application, in combination with water for cooling purposes, of a blast of air which has been passed over ice, and strikes the beer at right angles to its flow, substantially as and for the purposes set forth.

5th, The combination, in a beer cooler, of the double bottomed channels, B, with perforated air pipes, E, substantially as and for the purposes set forth.

6th, The combination in a beer cooler, of the rollers, j, provided with paddles, k, with the double bottomed channels, B, substantially as and for the purposes described.

83,100.—SOLDERING VESSEL.—Conrad Seimel, G'np'int, N.Y.

I claim 1st, The stands, A, in combination with the troughs, B B, and the gas apparatus, C, as herein described, for the purpose specified.

2d, The troughs, B, in combination with the shelves, b, as and for the purpose set forth.

83,101.—LAWN MOWER.—John Shaw, Brooklyn, N.Y. Patented in England January 23, 1864.

I claim folding the cutting end of lawn mowing machines up toward the handle end, for the purpose of being used for rolling only.

83,102.—BUCKLE.—Perry W. Smith, Abingdon, Ill.

I claim, as an article of manufacture, the within described double buckle, when constructed and operating substantially as and for the purposes herein set forth.

83,103.—MACHINERY FOR PRINTING YARN.—E. J. Stephens, Pawtucket, R. I.

I claim, in combination with suitable ribbed printing cylinders, A A, a series of furnishing colo rollers, D D, hung in yielding bearings, and operated by means of pinions, G, with teeth of variable depth, or the equivalents thereof, in the manner substantially as described for the purposes specified.

83,104.—GAS FURNACE FOR HEATING SOLDERING TOOLS.—J. H. Stimpson, Boston, Mass.

I claim the gas furnace for heating soldering tools, consisting of the double cones, A B, supporting the inclined cylinders, D E, containing the perforated cylinders, F G, composed each of two parts, f1 f2 g1 g2, said cylinders, D E, connected at their rear ends by the mouth pieces, d3 e3, and at their forward ends by the curved pipes, h2 h3, all arranged and operating as described for the purpose specified.

83,105.—CORN PLANTER.—S. L. Sweeney, Morrison, Ill.

I claim, 1st, The combination of the roller wheel, G, arm, H, rod, I, and oscillating plate, F, arranged to operate substantially as and for the purpose set forth.

2d, The combination of the wheel, G, the arm, H, connecting rods, I and N with the two oscillating wheels, F, arranged substantially as set forth.

3d, The combination of the wheel, G, with holes, G', and arm H, with holes H', for connecting and disconnecting the wheels and the dropping mechanism, substantially as set forth.

83,106.—SUGAR-JUICE EVAPORATOR.—James Taylor, Canton, N. Y.

I claim the described construction of the pan, A, having its sides extended to form legs, f f, and the side walls of the fire box, the latter provided with the door, h, at one end, and the chimney, B, at the other, all arranged to be moved upon the wheels e, away from or over the grate, D, formed between the ways, C, as herein set forth for the purpose specified.

83,107.—SEAM JOINT FOR CANS, ETC.—E. A. Thomas, Philadelphia, Pa.

I claim a side seam or joint for sheet-metal cans or boxes, composed of a dovetail projection, a, struck or swaged upon the lapped edges of the metal, and then hammer or closed down, substantially as herein shown and described.

83,108.—STEAM GENERATOR.—J. L. Thomas, Alliance, Ohio.

I claim, 1st, the combination of the float, B, chain, C, and weight J, with the serrated wheel, D, graduated wheel, E, adjustable plate, I, slotted arm, h, cock, G, and pipe, F, as herein set forth.

2d, The arrangement of the pipe, o, lever, R, and adjustable pin, S, with reference to the wheel, D, and whistle, P, as herein described.

83,109.—DEVICE FOR STRETCHING TELEGRAPH WIRES.—G. M. Thompson, Boston, Mass.

I claim the within described instrument for stretching telegraph wires, consisting essentially of the plate or bar, A, and jaws, C C, as set forth.

83,110.—HAY RAKE AND LOADER.—J. J. Thompson, Richwood, Ohio.

I claim the combination of the rotating device, F' H, rake, G, endless carrier D, pins or fingers, w, and stationary plate, i 12, all constructed, arranged, and operating in the manner and for the purpose set forth.

83,111.—CULTIVATOR.—J. J. Thompson and V. F. Collier, Richwood, Ohio.

We claim the combination, in a quadruple plow or cultivator, of the inner movable beams, B B, staples, b b, rod, F, plates, D D, outer stationary beams B' B', tongue, A, plate, I, and handles, L L, all applied in the manner and for the purpose set forth.

83,112.—SASH LOCK.—E. H. Tobey, Bridgeport, Conn., assignor to himself and A. R. Hale.

I claim the arrangement of the bolt, A, within the cylinder, C, when the said cylinder is provided with two slots, a and d, and the bolt with the stud, f, to operate in the said slots, substantially in the manner specified.

83,113.—DIAPHRAGM BELLOWS FOR DRY GAS METER.—A. Tufts, Malden, Mass. Antedated Oct. 3, 1868.

I claim a gas-meter bellows in which one head is annular, with an attached flange, to which the flexible material of the bellows is secured, and in which head the opening through which the former is extracted in parts is closed by soldering the disk, 1, at its edge which is remote from the cord, h, which secures the flexible material, g, to the flange, e, substantially as described.

53,114.—CALORIC ENGINE.—H. D. Wallen, Jr., Fort Columbus, N. Y.

I claim, 1st, The two parallel cylinders, A B, when arranged side by side, and provided at both ends with air-heating chambers, A' A'' B' B'', and the valve gear to cause the alternate movement and resting of the pistons, all substantially as shown and described.

2d, The rocks shafts, P P', having arms, e R R', the connecting rods, S S' T, and angular lever 1', substantially as herein shown and described, in combination with and arranged with relation to the shaft, M, slotted plate, U, slotted arm, V, and cross heads, R'', as set forth.

83,115.—PAPER CUTTER AND RULER.—S. W. Wilcox, Mendon, Mass.

I claim, 1st, A paper cutter, provided with a series of parallel slits for ruling parallel lines, substantially as herein described,

2d, The construction of a ruler with a perforated scale, substantially as and for the purpose herein set forth.

83,116.—STOP MOTION AND INDICATOR FOR KNITTING MACHINE.—Elihu Wilder, Chicopee Falls, Mass.

I claim, 1st, the shaft, H, carrying the adjustable fingers, h h' h'', substantially as described

2d, The combination of the bolt, G, with the pawl, G', and ratchet, G,'' and shaft, H, carrying the fingers, h h' h'', made adjustable, and held in position by set screws or thumb screws, and operating upon the pawl of a ratchet, for the purpose of stopping the machine at any number of rounds or stitches, substantially as set forth.

3d, The combination of the shaft, H, having the adjustable fingers, h h' h'' with the ratchet, G'', pawl, G', bolt, G, sliding bar, E', having the trip dog' E, and the cam grooved cylinder, C, applied to a knitting machine, substantially as described.

83,117.—CHAIN PUMP VALVE.—Orrin O. Witherell, Lewiston, Me.

I claim the plates, A B, having the links, D D, secured upon the elastic plate, C, and washer, F, by means of the countersunk screw, E, extending centrally through the plate and washer, between the ends of the link into a nut, G, between the ends of the link upon the plate, B, as herein described and shown.

83,118.—PIPE COUPLING.—William H. Yeaton, Philadelphia, Pa.

I claim, 1st, The combination of the portions, A and B, of the coupling with the yoke, D, the whole being constructed and arranged substantially as and for the purpose described.

2d, The plug, C adapted to the portion, B, of the coupling, and having a handle, i, arranged in respect to the yoke, D, substantially as set forth.

3d, The combination, with the yoke, D, of a lid or bonnet, F, having lugs, t t, and hinged or otherwise adapted to the portion, B, of the coupling, for the purpose specified.

82,119.—MANUFACTURE OF IRON AND STEEL.—Richard Yielding, Detroit, Mich.

I claim, 1st, The process of fusing and refining metal, and decarbonizing iron.

2d, The converting of iron into carbonized steel.

3d, The converting of iron into unannealable steel, and the use of the foregoing articles, in the manner and for the purposes herein set forth, and the general combination of the principles, and the use of the articles, combined and separately, and for the use of the oil alone, in the manner and for the purposes set forth in the foregoing specifications.

83,120.—TABLE CLOTH PROTECTOR.—Mrs. J. H. Mott, Washington, D. C.

I claim a table-protecting apron, formed with raised edges, a a, and attaching straps, c c and e, the whole constructed and arranged substantially as described, for the purposes specified.

83,121.—PROCESS OF ROASTING AND CHLORIDIZING ORE.—Henry Tindall, Chicago, Ill.

I claim the process of treating ores, substantially such as is above described.

83,122.—FURNACE FOR ROASTING AND CHLORIDIZING ORE.—Henre Tindall, Chicago, Ill.

I claim, 1st, A furnace for treating ores, in which the operation of desulphurizing and chloridizing or chlorinating such ores is performed simultaneously with the roasting of the same, substantially in the manner described.

2d, The chamber, E, of the furnace, as composed of a metal bottom, with metal sides and roof, said bottom and sides being protected from the action of the sulphur, substantially as shown and described.

3d, The combination of the chamber, E, and the gas generating apparatus, substantially as shown and described.

4th, The combination of the ore supplying conduit and the chamber, E, substantially as shown and described.

5th, The arrangement of the sole or hearth with reference to the chute, P, substantially as shown and described.

6th, The arrangement of the walls or partitions, C C' by which they are made to support the sole or hearth, substantially as shown and described.

7th, The arrangement of the car, R, with reference to the chute, P, and chamber, E, substantially as shown and described.

83,123.—PISTON ROD PACKING.—Orrin Collier (assignor to himself and Erva B. Silliman, Sacramento, Cal.

I claim, 1st, The metal rings, a and b, as constructed, so that they have about the same amount of surface bearing against the rod, and both about the same amount of surface bearing against the face of the gland, whereby the two shall wear equally, substantially as described.

2d, The construction of the packing with reference to the stuffing box, whereby a free space is left around the ring, so as to allow them to move freely with the rod, if it should not work perfectly true.

3d, The gland, C, and the lining, E, with the oil cup, F, when arranged substantially as and for the purpose herein described.

REISSUES.

35,925.—LAMP BURNER.—James Donning, Bridgeport, Conn.

Dated July 22, 1862; reissue 3,158.

I claim a flat flame or wick, having a flame slot, in combination with a sliding support, the two being connected together, and removable from the wick tube, and an air space being provided between the sliding support and the side of the wick tube, substantially as specified.

67,355.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—Henry Richardson, New York, assignee, by mesne assignments, of Edwin M. Scott, Auburn, N. Y. Dated July 30, 1867; reissue 3,159.

I claim, 1st, In combination with a revolving grinding wheel or stone, on the end of a shaft, the vertically, or nearly so, swinging frame, for holding the reaper knife to be ground, so that it may be swung up to the stone or back, to be examined by the operator, substantially as described.

2d, In combination with the swing frame, the inclining of the clamping bar, so that the sections or edges to be ground may be brought in their entire length to the grinding surface of the stone, substantially as described.

3d, The combination of the disk, slides, and thumb screw, as and for the purpose set forth.

4th, The combination of the disk, slides, bolt, and lever, substantially as and for the purpose described and represented.

65,963.—SLEEPING CAR.—John Swan, Baltimore, Md. Dated June 18, 1867; reissue 3,160.

I claim, 1st, A series of staterooms made crosswise of the car, and provided with a side passage and independent ventilation, substantially as and for the purpose set forth.

2d, The reservoir F, pipes, H H, and basins, J J, for supplying water to the staterooms, substantially as specified.

3d, The side passage, C, when used in combination with a series of cross berths or staterooms, as and for the purpose set forth.

EXTENSIONS.

IMPROVEMENT IN SPRING ROLLERS FOR WINDOW CURTAINS, ETC.—Benjamin Bray, of Salem, Mass.—Letters Patent No. 11,638, dated September 5, 1854.

I claim providing the tubular or hollow curtain roller with a long spiral spring within it, when said spring is used for the purpose not merely of drawing up the curtain by its recoil, as that is not new, but of palanceing it in any position in which it may be placed, substantially as herein described.

DESIGN FOR CLOCK CASE FRONT.—Elias Ingraham, Bristol, Conn.—Design No. 107, dated Sept. 3, 1860.

I claim the design for a clock case, as hereinabove illustrated and set forth.

CALENDAR CLOCK.—Wm. H. Akins and Joseph B. Burritt, Ithaca, N. Y.—Letters Patent No. 11,711, dated Sept. 19, 1854.

We claim, 1st, The arrangement of the four rows of teeth on wheel, L, as shown in fig. 8, in combination with the corrugated plate, N, the detent X, and the arm, O, the rocking shaft, P, and the slotted arm, Q or the equivalent of said arms and rocking shaft, and for the purposes set forth.

2d, Raising the click, 37, over four or more of the teeth of the wheel, L (when run down), on the first day of the month, thereby acquiring a retaining power sufficient to be used in the short months, thus moving the wheel, L, carrying the hand, I, on the dial, from the 28th of February, past the 29th, 30th, and 31st divisions of the wheel, L, to the fig. 1, or the 1st day of March, those teeth (the 29th, 30th, and 31st) being removed, the detent, X, stopping the wheel, L, at the point marked , on fig. 8, indicating the first day of every month, one tooth only being used, except at the last day of a short month, the rod, 30, slipping through the end of the lever, Y.

3d, We also claim the combination of the helix, V, the lever, Y, lifting rod, 30, the detent, X, the pin, 55, the click, 37, the wheel, L, and spring, 7, and for the purposes described, that is, giving movement to the wheel, L, the rollers, F G and H, being moved by similar devices.

SAFETY WASHER FOR SECURING WHEELS TO AXLES.—Wm. Thornley, Philadelphia, Pa.—Letters Patent No. 11,705, dated Sept 19, 1854.

I claim a washer having a projecting flange and stop or stops; also the cap, with the stop or stops, as described, for the purpose specified.

MACHINE FOR WASHING PAPER STOCK.—Horace W. Peaslee, Malden Bridge, N. Y.—Letters Patent No. 12,283, dated Jan. 23, 1855: antedated Sept 20, 1854; reissue No 340, dated Jan. 8, 1856; reissue No. 2,515, dated March 19 1867.

I claim a rotating pervious cylinder, provided with projecting teeth on the inside and mounted substantially as herein described, so as to be sustained and rotated without a shaft and arms, that the inside and ends may be unobstructed for the passage of the stock, substantially as and for the purpose described.

And I also claim, in combination with a pervious rotating cylinder, armed with teeth on the inside, substantially as described, the means, substantially as described, for the introduction of water through the meshes of the cylinder to the stock inside, as and for the purpose described.

FURNACE OR HEAT AND GENERATOR RADIATOR.—Gardner Chilson, Boston, Mass.—Letters Patent No. 11,718, dated September 26, 1854; reissue No. 1,782, dated September 27, 1864.

I claim, in combination with one or more tapering tubes, substantially as described, made to communicate in the fire chamber essentially as specified, a conical or tapering radiator closed at top, and arranged directly over the fire, and made open near its base in the said tapering tube or tubes, and to operate, with respect to them, and the fire pot or chamber and the surrounding air or medium to be warmed or heated, substantially as specified.

I also claim arranging the feed or fire place door within the trunk or mouth piece to the fire pot or place, and so as to operate as specified.

And in combination with the mouth piece, and the door arranged in it as specified, I claim the passage in the mouth piece and its plate, c, for the thin sheet or stratum of air to pass under the door, while it is wholly closed, and said plate, c, and be heated by contact with the plate before it, the said air, reaches the fuel.

And in combination with the inclined door of the fire place, the plate, c, and the air passage directly under it, I claim the ledge or flange, a', arranged as described, the same being not only for the purpose of regulating the admission of air into the passage, but of keeping it from passing under the door and over the plate, c, while the ledge is below the level of the top surface of the plate.

I also claim the arrangement of the register hole (viz., in line of or axially with respect to the shaft of the grate), in combination with the arrangement of the outer end of said shaft, viz., entirely within the throat of the ash pit, or in rear of the registry plate or opening as specified, the said arrangement not only enabling me to dispose the grate shaft entirely within the ash pit mouth (the end of said shaft, when projecting from the front face of the furnace, being, generally speaking, more or less in the way, besides presenting an appearance often disagreeable to the eye), but to make the registry opening answer the purpose not only of admitting air to the fire when required, but of enabling a person to place a key or crank upon the shaft for the purpose of turning or moving the grate when necessary, and this without danger of ashes escaping out of the ash pit, provided its door be closed.

I also claim the combination of a fire pot, a dome surmounting it, a series of flues (leading from the base or lower part of the dome), the whole being substantially as hereinbefore described

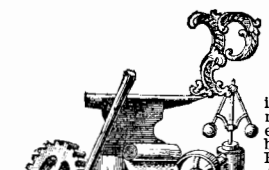
I also claim the combination of a fire pot, a dome surmounting it, a series of flues (leading from the base or lower part of the dome), and a series of conical or partially conical bases or semi cones, serving not only to facilitate the entrance of smoke and heat into the conical radiators or flues, but the absorption of heat and its radiation toward the floor, and its reflection into the tapering radiators, the whole being substantially as specified.

I also claim the combination of a fire pot, a dome surmounting it or placed over it, a series of flues (leading from the base or lower part of the dome), and a hollow ring or annual radiator placed on and opening out of the said flues, the whole being substantially as hereinbefore explained.

NEW PUBLICATIONS.

A MANUAL OF PRACTICAL ASSAYING. By John Mitchell, F.C.S. Third Edition. Edited by Wm. Crookes, F.R.S., etc. London: Longmans, Green & Co., 1868.

We are indebted to the publishers for a copy of the above work, the merits of which have been thoroughly recognized by scientific men. The present edition contains all the important discoveries necessary to bring it completely up to the requirements of modern assaying, special attention having been paid to the Volumetric and Colorimetric Assays, as well as to the blowpipe assays. The portion of the work devoted to the subject of oil and gas-blast furnaces is of great value. The work has been carefully and ably edited, and is printed in clear bold type. It is the best, in fact the only complete English work upon the subject. The old nomenclature has been retained, but as the work is written rather for practical assayers than as a text book, this is hardly a defect. It would be difficult find any fault with the book, still more so to suggest any improvement.



PATENTS.

The First Inquiry that presents itself to one who has made any improvement or discovery is: "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

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The model should be neatly made of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show with clearness, the nature and operation of the improvement.

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When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

Reissues.—A reissue is granted to the original patentee, his heirs, or the assignees of the entire interest, when by reason of an insufficient or defective specification the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

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Caveats.—A Caveat gives a limited but immediate protection, and is particularly useful where the invention is not fully completed, or the model is not ready, or further time is wanted for experiment or study. After a Caveat has been filed, the Patent Office will not issue a patent for the same invention to any other person, without giving notice to the Caveator, who is then allowed three months time to file an application for a patent. A Caveat, to be of any value, should contain a clear and concise description of the invention, so far as it has been completed, illustrated by drawings when the object admits. In order to file a Caveat the inventor needs only to send us a letter containing a sketch of the invention, with a description in his own words. Address MUNN & CO., 37 Park Row, New York.

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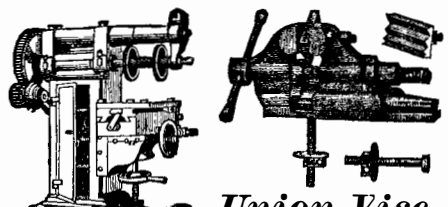

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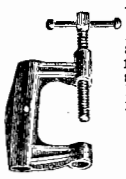

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U. S. PATENT OFFICE
Washington, D. C., Oct 10th, 1868.

Newell A. Prince, Simsbury, Conn. having petitioned for the extension of the patent granted him on the 23d day of January, 1855, for an improvement in "Fountain Pen," it is ordered that said petition be heard at this office on the 28th day of December next

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

18 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE.
Washington, D. C., Oct. 7 1868.

Fanny Holmes, of Whitehall, N. Y., executrix of the estate of John E. Newcomb, deceased, having petitioned for the extension of a patent granted the said John E. Newcomb on the 9th day of January, 1855, for an improvement in "Grain Harvesters," it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

18 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Oct., 2d, 1868.

Marshall Burnett and Charles Vander Woerd, Boston, Mass., having petitioned for an extension of a patent granted them on the 2d day of January, 1855, for an improvement in "Grain and Grass Harvesters," it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

17 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Oct. 3, 1868

Lysander Wright, of Newark, N. J., having petitioned for the extension of a patent granted him on the 2d day of January 1855, for an improvement in "Sawing Machine," it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

17 3 S. H. HODGES, Acting Commissioner of Patents

U. S. PATENT OFFICE,
WASHINGTON, D. C., Oct 2d, 1868.

Ambrose Foster, of Lauraville, Md., for himself and the representatives of J. A. Messenger, deceased, having petitioned for an extension of the patent granted the said Ambrose Foster, on the 16th day of January, 1855, for an improvement in "Building Blocks," it is ordered that the said petition be heard at this office on the 21st day December next

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

17 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Sept. 12, 1868

Martin P. M. Cassity, of Granada, Kansas, administrator of the estate of Isaac H. Steer, deceased, having petitioned for an extension of the patent granted to Henry Carter, assignee of said Steer, the 19th day of June, 1855, antedated the 19th day of December, 1854, for an improvement in "Making Nuts," it is ordered that said petition be heard at this office on the 12th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

17 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Sept 24, 1868.

P. W. Mackenzie, of Orangeville, N. Y., having petitioned for an extension of the patent granted him on the 2d day of January, 1855 for an improvement in "Machine for Blowing Blasts" etc., it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

16 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Sept. 26, 1868.

Allen B. Wilson, of Waterbury, Conn., having petitioned for an extension of the patent granted to him on the 19th day of December, 1854, for an improvement in "Sewing Machines" it is ordered that said petition be heard at this office on the 7th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

16 3 S. H. HODGES Acting Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Sept. 30th, 1868

Jesse W. Hatch and Henry Churchill, of Rochester, N. Y., having petitioned for an extension of the patent granted to them on the 2d day of January, 1855, and reissued on the 24th day of July, 1866, for an improvement in "Machines for Cutting Boot and Shoe Soles," it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing

16 3 S. H. HODGES, Acting Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Sept. 30, 1868

Arnton Smith, of Girard, Ill., having petitioned for an extension of the patent granted him on the 16th day of Jan., 1855, for an improvement in "Plows," it is ordered that said petition be heard at this office on the 21st day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed at this office twenty days before the day of hearing.

16 3 S. H. HODGES, Acting Commissioner of Patents

U. S. PATENT OFFICE.
WASHINGTON, D. C., Sept. 21, 1868.

Hannah M. Brown, of Woonsocket, R. I., administratrix of the estate of John E Brown, deceased, and W E. Barrett, of Providence, R. I., executor of the estate of Stephen S. Bartlett, deceased, having petitioned for the extension of a patent granted to the said John E. Brown and Stephen S. Bartlett, on the 2d day of Jan., 1855; reissued Jan. 1st, 1861, and again reissued Feb. 25, 1862, in three divisions, numbered respectively 1281, 1282, and 1283, for an improvement in "Grain and Grass Harvesters," it is ordered that said petition be heard at this office on the 14th day of December next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

16 3 S. H HODGES, Acting Commissioner of Patents.

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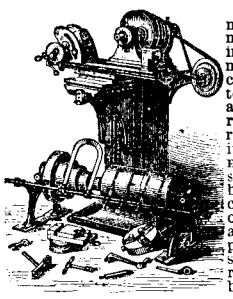

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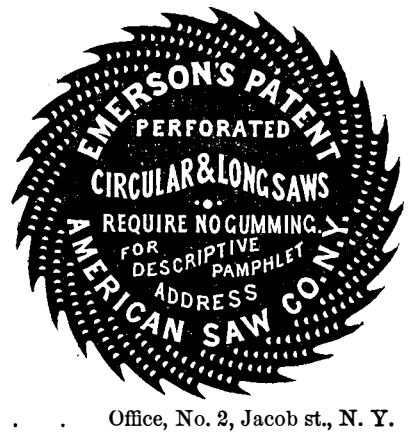

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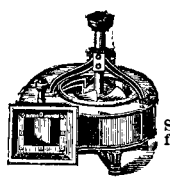

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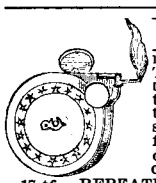

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